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Women in Development

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Women and Development

Objectives, Frameworks, and Policy Interventions

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The private and social returns are high on investments to improve women's economic productivity— particulary education. Where women receive less education than men, efforts to redress that imbalance deserve priority. Measure to open women's access to information, technology, productive resources, and credit should also be tested far more extensively.

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The contribution of women to an economy is in principle no different from that of men. But in practice, the problems of valuation, measurement, and policy inference are more complex — and the implications for policy and programs may be more controversial and culturally sensitive.

Reviewing and integrating several lines of economic research on how women affect economic and social development, Shultz concludes that:

- Private returns to investment that enhance women's market and productivity are high, notably in primary and secondary education, especially in regions where women now receive less education than men.

- These investments shift the allocation of women's time toward market work and away from home-based work.

- These investements benefit the health and nutrition of the women's children and immediate family members.

- These investments reduce desired fertility and increase women's ability to obtain and use family planning services more effectively.

- These investments make women more efficient managers of family resources of land, fuelwood, water, and food.

- Family planning and family health "outreach" programs especially help women, because women's mobility is particularly constrained by culture and the practical realities of childbearing and childcare.

- For similar reasons, extension or similar outreach activities can increase the productivity of women in home-based production, including agriculture and the provision and use of household water.

- Extension or outreach programs can correct factor market distortions, provide women with more equal agricultural and household technologies, and expand the effective supply of credit where women produce for market.

To give us more firm evidence of how public policies affect women's productivity and family consumption patterns, Schultz recommends pilot programs to:

- Increase school enrollment and graduation rate for girls.

- Assess the effect of equalizing access to agricultural extension services by male and female farmers in Africa, Southeast Asia, and Latin America.

- Explore alternative configurations of child and maternal health programs, varying the mix of staff by level and gender.

- Evaluate program innovations in the delivery of credit, such as the Grameen Bank in Bangladesh.

All these pilot programs should be designed to monitor the families' choices that affect whether they produce healthy and educated sons and daughters.

This paper is a product of the Women in Development Division, Population and Human Resources Department. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Johanna Klous, room S9-121, extension 33745.

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Women and Development: Objectives, Framework,

and Policy Interventions

1. Introduction

This paper examines from an economic perspective women who, as producers and consumers, are attached at various stages in their lifetimes to families and households. Women's contribution to the economy is in principle no different than men's. In practice, however, the problems of valuation, measurement, and policy inference are more complex. Moreover, the design and evaluation of development policies to increase women's productivity and advance other social objectives are culturally sensitive, because these policies may change customary patterns of work, specialization, and the evolution of the family and other basic social institutions.

All societies coordinate, in one way or another, production and consumption of goods, child bearing, and investment in human capital, such as education, and nonhuman capital. This occurs because such cooperation generates important economies, including increased scale of production, specialization, and shared consumption of public goods. Many activities that produce goods and services and allocate them among persons are coordinated by semi-permanent family groups that are not restricted to one sex or age. These family groups may also share a residence and join in reproduction and extended periods of child rearing. A common group is a nuclear family, perhaps with older members, but of course families take diverse forms around the modern world. It is difficult and probably inappropriate to analyze women's contribution to the development process without reference to the family or household.

Changes in women's earning power compared to men's and children's can affect what the family does better than other institutions in society, such as

firms and government. Functions where the family retains a comparative advantage may also be performed with a different mix of labor and capital as the economic capabilities of women approach those of men.

No matter how overall economic coordination is achieved, governments are limited in their ability to redistribute resources among persons within families. This is because families can compensate for most government transfers, readjusting the allocation of private resources within the family until the distribution of total resources among persons again reflects the incentives and values of the family (or its more powerful members). To propose sensible policies that will affect women, it is essential to understand how family incentives affect women, children, and men; how government activities penetrate the family and modify women's economic capabilities; and how the costs and results of such government activities compare to other social investments.

The family's consumption patterns, savings, and investments in family members may all change when women's and men's productive capabilities change. To maximize production and growth, internal rates of return to investments should be equalized across the formation of human capital, the increase of home-based production, and the increase of firm based-production. A divergence in the estimated rates of return to investments in home, firm, and human capital suggests an inefficiency, and calls for an analysis to isolate what institutions, information or incentives could be responsible for the seeming misallocation of resources.

Empirical evidence on the responsiveness of persons and families to different external influences and constraints show what the limits are on the decision-making units responsible for particular forms of behavior, ranging from a lone individual to an extended family. Such specific knowledge about

family coordination and pooling of economic resources also helps to specify general models of the family that better reflect the conditions that constrain family choice in various cultures. More accurate predictions of the impact of socioeconomic change and policies should then be feasible insofar as they affect families and particular members of these families.

Economics of the Family and Development

In more traditional agricultural societies and in the early stages of the development process, the family and the simple firm blend together. As trade and industrial specialization develop, technical economies in the scale of production emerge, and firms gradually replace families as the main source of output, except perhaps for agriculture (Kuznets, 1957; Schultz, 1988a). This shift in production from family enterprises to non-family firms is associated with greater participation of women's in the work force on a more equal footing with men (Boserup, 1970; Schultz, 1988a). Initially, women are often confined to a broad set of home production activities. Later they move to participate more fully in wage and salary jobs outside of the family, to reap the full benefits of more specialized vocational training.

It is often said that by obtaining a job (for wages) outside of the family, a woman increases her control over the productive returns to her labor and hence gains relative influence over how the family uses its economic resources. Women may be motivated to enter the wage labor force, either by domestic poverty, or by the appeal of employment opportunities outside the home. The level of a woman's productivity is of primary importance to her welfare and that of her children, but the conditions under which she works may also matter. Changes in women's labor force participation may be a good or ill event, depending on its causes. To distinguish between such income and

wage effects on a woman's marketed supply of labor, many factors must be evaluated together, as specified by a family model of decisionmaking.

Moreover, the distinctive role of women in managing investments in children may be a strong reason for increasing women's capabilities and their control over family resources. Improving the productivity of women is a social objective to advance economic development, and also possibly to channel that development toward socially desired investments in the food, health care, and schooling of children. Raising women's productivity often also leads to reduced child mortality and, at approximately the same time, to a reduction in fertility. If the latter more than offsets the former, the rate of population growth may be reduced and the proportion of the population in the labor force may be slowly increased, as the demographic transition progresses. Quantitative confirmation of these apparent linkages, however, requires much study and replication to build sound generalizations from empirical regularities and to identify the special features in society that affect these behavioral tendencies. If these empirical studies are guided by a coherent modeling framework, the accumulation of useful knowledge can be expected to occur more rapidly.

Concepts of the Family Guiding Empirical Analysis

A conceptual and statistical framework is essential to draw inferences from nonexperimental data about how family production, consumption, and behavior respond to changes. This applies to experimental pilot programs as well. It is hard to forecast how social institutions, such as families, firms, and government social programs will evolve over time. The first step is to work out the rules for decision-making in the family that account for observed producer and consumer behavior. This requires analysis of how individual,

social, and environmental constraints interact to determine the productivity and role of women in a particular society. Such constraints must be clearly defined, adequately measured, and beyond the family's direct control or exogenous to the family. Where the line is drawn between family choice variables and exogenous constraints depends on the question addressed. The analysis may encompass the broader extended family, if its members pool resources and share obligations. This coordinating group is the elusive starting point for empirical analysis. Two questions are paramount: How extensively do individual and family decisions interact? What are the economic limits to the family?

Ultimately, the family has a life cycle perspective. Moreover, there is an element of inter-generational altruism as parents spend part of their earnings to help their children, and grandchildren, ad infinitum. However, past decisions in the life cycle of the family should not be viewed thereafter as exogenous constraints on later behavior. Women who worked before marriage are certainly more likely to work after marriage than other women, for example, and they may also have fewer births. But do the work decisions influence the fertility decisions, or do both instead depend on other exogenous influences or unobserved variables, such as preferences, operating on the basic sequence of lifetime choices?[1] The latter is more nearly correct. Marital status, work patterns and fertility are thus considered all endogenous and in need of explanation. According to many studies, the likelihood of being married, or living in a family depends on the distribution of endowments and capabilities of men and women (e.g., Becker, 1974, 1981; Friedan, 1974; Grossbard, 1976; King et al., 1986; Montgomery and Sulak, 1988). If the aim is to estimate the longer-run tendencies of families, and hence society, to adjust to changing conditions and constraints, a longer sequence of these interdependencies

should be viewed as endogenous. The modeling framework should thus specify the timeframe and the appropriate class of endogenous outcomes and exogenous conditions.[2]

To determine what family group decides on any particular production, consumption, investment, or behavioral decision in each society, it may be necessary to design new sampling procedures to collect data from several potentially relevant groups of family members. In some societies, for example, men might be expected to help pay the school fees of their sister's children, in which case the schooling decision will be imperfectly understood unless the wage rate and unearned income of uncles are included among the constraints on child enrollment. A simple empirical test of the limits to such a family decisionmaking process would establish whether an uncle's endowments affect significantly a child's schooling behavior. Conversely, if financial transfers are observed from the child's uncle to the child's mother, they should be treated as endogenous variables, potentially identified, perhaps, by information on the uncle's exogenous endowments.

Many disciplines contribute to the empirical literature on linkages within the family and offer evidence on how women's capacities are increased and how they in turn affect the productivity, welfare, and behavior of family members. These studies employ disparate standards for statistical evidence, and do not share the same modeling methodologies. Categorizing constraint-like variables into exogenous conditions and endogenous restraints that evolve over time because of past decisions is therefore an important step in formalizing an analytical framework that can potentially illuminate empirically women and development.

2. Consumption and the Family

"Who deserves consumption" involves the values of society and the family, and is not necessarily clarified with the tools of welfare economics. Economists can postulate a social-welfare function that will permit welfare comparisons to be drawn between persons and thus derive "optimal" distributive policy. But such economic formulations are rarely responsible for the transfer schemes that societies adopt. Nor are they often a persuasive basis for designing policies to intervene in the economy. Yet it may be possible to describe the tradeoffs made by society and by the family and thus identify factors affecting intrahousehold consumption patterns. This section discusses the neoclassical model of family behavior, suggests its limitations, and explores a more flexible "bargaining model" of family decisionmaking. This latter model recognizes the different interests in, and control over, resources that individual family members have.

Models of Family Behavior and Distribution

What is responsible for the inequality between men and women and why should it vary in different countries? Undoubtedly a tension exists in the family between efficiency and equity, as it does in society as a whole. From the point of view of efficiency, a family member's food, consumption, health, and long term formation of skills, such as education, should be supported only so long as these investments are more profitable than alternatives. Conversely, pure parental altruism could lead parents to consider each child's satisfaction as important as their own. This would encourage parents to invest in their children's endowments until they are similar to that of the parents. Egalitarian parents may also derive satisfaction from leaving their children equally "well off." By contrast, the criterion of efficiency is

likely to encourage parents to invest more human capital in the children who are more able, assuming that these natural abilities enhance the returns on parental investment. Parental bequests to less able children would then include a greater proportion of property whose market rates of return are not affected by the child's ability. In this manner, Becker and Tomes (1979) show how parents might distribute their human and physical investments among their children of differing ability. If the marginal returns on human capital exceed those on physical capital for any child, the parents' pursuit of efficiency would come into conflict with their ideal of consumption equality in the family (Becker, 1981). Available evidence suggests that on average the private rates of return to investments in education are larger than the returns on nonhuman capital today in low income countries (Psacharapolos, 1973). In these circumstances, intergenerational mobility is accomplished by parents more efficiently if they invest in the education of their children rather than transfer to them property during their lives or through bequests.

Empirical estimates of intrafamily distribution of consumption and human capital investments provide clues as to how families trade-off efficiency and equity. Does this trade-off differ at different levels of family income? Are such differences comparable in different societies? Families may balance the objectives of efficiency and equity differently when average income falls toward subsistence and the family's very survival is at risk. Sex differentials in child survival, nutrition, and schooling offer a basis for analysis of welfare differences between girls and boys. These in turn affect the economic capabilities of adult women and men--and thus influence their social mobility and inequality, as well as on their productivity.

These gender differentials within the family are analyzed here, first

across households within societies. Interpreting these differentials and estimating how policy might affect them requires a framework that accommodates the salient constraints on the family and accounts for critical features of the personal distribution of family consumption and human capital investment. A more complete model must also describe who is found in a family or, more precisely, family composition. Adults that are observed to reside in families are not a random sample; they are selected according to criteria that are likely to also influence what they expect to receive from the family's resources. A sample selection bias is therefore potentially present in any analysis restricted to families. The decision rules that govern family formation and marriage should be combined with an analysis of the constraints determining intrafamily resource allocations. Though elements of such a theory are at hand (McElroy, 1988), empirical applications are limited and largely confined to U.S. data. But the theoretical approach is well suited to the study of women's productivity in low income countries.[3]

Models of Marriage and Family Behavior

Adults presumably maintain their attachment to their existing family, or marry, or go their separate way, because there are net gains in doing so as compared to other foregone opportunities. In marriages, so long as both partners share the net gains in excess of the opportunity costs given up from alternative arrangements, the union has at least an economic basis for continuation (Becker, 1974). The division of output between partners might be studied as it responds to market forces (Becker, 1981:42). But it has not received attention because it is hard to attribute consumption to a particular family member, and traditional models of the family do not prescribe distributional rules.

The classical unified family decision-making framework assumes that the family behaves as if it is trying to allocate the time of its members and other endowments to satisfy a common set of "family" preferences (Becker, 1965). This process involves pooling resources and agreeing on the form of the family's preferences. Becker (1974) describes conditions under which this process could take place. The simplest assumption is for couples to share the same preferences. Given the limitations of this working assumption, Becker describes a dominant family decisionmaker, the husband, who allocates the gains from marriage to reward the other individual with more than she expects to receive as a single person or in another union. Incentives are also established to encourage the non-dominant member to allocate her time and other family resources to accomplish the solution chosen by the dominant individual. If the gains from the union are insufficient to motivate coordinated family behavior, the family may dissolve. This second model, though it is more realistic than the first, still does not imply any testable predictions about intrafamily consumption. One way to proceed further would be to specify the structure of household production and then estimate the magnitude of the gains from marriage based on the endowments of the partners, market prices, and production technology (Wallace, 1974).

How are such marital gains actually distributed? The family demand system does not help in predicting which intrafamily allocations are more likely to occur. It does imply strong restrictions, but these may not fit data because the demand model also depends on auxilliary assumptions, such as the functional form of relationships, that are not central to the conception of a unified family decisionmaker.

Extending the family demand model to accommodate the conflicting inter-

ests of family members is a reasonable next step These conflicts of interest must be resolved by a specific bargaining mechanism to be tractable and testable. Many game theoretic models do not imply unique solutions, nor do they lend themselves easily to empirical testing. The cooperative Nash-bargained framework, as stated by McElroy and Horney (1981), is an interesting possibility. It nests within it as a special case the unified family demand system. Statistical tests can be readily implemented, therefore, to determine whether data on observable family behavior satisfy the restrictions implied by the unified family demand model, or instead, suggest that this systematic form of bargaining is consistent with the data. These tests are also intuitive: They simply imply that nonearned income of the husband or wife may influence consumption differently. When the woman controlls physical assets or streams of nonearned income, her bargaining power in the family to distribute the family's resources is increased. If these tests support the bargaining model versus the unified family demand model, additional more complex tests of the extended demand system can be worked out (Horney and McElroy, 1988).

Other approaches to bargaining behavior in marriage involve making specific assumptions about asymmetric information available to spouses, assume differences in transaction costs within and outside of the family, or specify the form of the utility function for the family (e.g., Fabella, 1982). For many reasons, few empirical tests have been implemented to show that any of these bargaining approaches are helpful in explaining family behavior. Acceptance of bargaining models of family decision-making will depend on comparisons of the model's capacity to account for related forms of family behavior that are not adequately explained by the unified family demand model (Manser and Brown, 1980; McElroy and Horney, 1981; Pollak, 1985; Jones, 1986;

Peters, 1986; Carlin, 1988; Schultz, 1988c).

Empirical Evidence on the Nash Bargaining Model of the Family

Evidence is slowly accumulating that is consistent with the cooperative Nash-bargained model of family decision-making but not with the strict formulation of the neoclassical unified family demand model. Other models of bargaining may be developed that are less restrictive and more general than the cooperative Nash-bargained solution, and they may permit the partners to know different information and choose among a wider range of Pareto allocations (Chiappori, 1988). But the goal here is to describe the initial modeling efforts that have added flexibility to the neoclassical family demand model by dealing with the distinct interests and resources of family members. The model should also allow eventually for a partial pooling of resources, rather than the complete pooling assumed in the family demand model.

Consider, for example, how the individual supplies labor. It is generally assumed that increases in nonearned income (not contingent on the individual's allocation of time) increase demand for leisure and nonmarket time and reduce time supplied to the labor market. As this framework was adapted to analyze the labor supply behavior of wives and then other family members (Mincer, 1963; Koster, 1966; Heckman, 1971), the leisure of each family member was added to the family utility function, but the family's nonearned income was pooled. This approach to family demands and labor supply consequently assumes that the effect of nonearned income would be identical regardless of the individual's status in the family or the source of the nonearned income. Situations may arise where this neoclassical assumption appears realistic and others where it does not conform to what we know about resource pooling of family members or coordination of decision-making.

The cooperative Nash-bargained model assumes the partners cooperatively maximize a product of the individuals' marital gains in their utility compared to their utility available outside of the union. This utility of the alternative state represents a "threat point" beyond which the partner would leave. It thus limits the consumption allocations within the family that are acceptable to both spouses. Nonearned income of the husband or of the wife will, thus, influence the "threat point" of that spouse: it leaves the spouse less dependent on marital gains. It thus strengthens the spouse's bargaining power, and potentially changes the distribution of consumption in the family.[4] This would be most obvious in its effect on the consumption of leisure, since this is thought of as a private good. The effect on other forms of consumption may be more ambiguous, such as expenditures on tobacco, alcohol, toys or apparel, for there is nothing to prevent wealthier women or men from deriving satisfaction from varied consumption activities.

Consequently, nonearned income (or its sources) should be divided into those elements brought to the marriage or accumulated during the marriage through distinct individual activities, the receipt of bequests or transfers, or other personal connections. A wife's nonearned income, such as she might have inherited or brought to the marriage as a dowry, might be expected to reduce her market labor supply more than the same amount of nonearned income brought to the marriage by her husband.[5] Conversely, the payment of a bride-price in many areas of subSaharan Africa by the groom to the bride's parents may be associated with the bride increasing her supply of time to the labor force.[6] This prediction of the individualistic bargaining model received only modest support from its first empirical test against U.S. household data (Horney and McElroy, 1988). Subsequent study of the allocation of time of

U.S. husbands and wives to housework provided more support for the bargaining approach (Carlin,. 1988). But data from Thailand strongly confirm its usefulness (Schultz, 1988c).

In the 1981 Socioeconomic Survey of Thailand, participation by women aged 25 to 54 in the labor force is reduced by three times as much for a given flow of nonearned income (from rentals, interest or dividends) if that nonearned income is owned by the woman as compared to the effect of that income if it is owned by her husband. Conversely, men aged 25 to 54 reduce their participation by three times the amount when the family's nonearned income is owned by the man rather than his wife (See Appendix Tables A-3 and A-4). In Thailand women are frequently in the labor force, and while marriage has been nearly universal, they often divorce and remarry. It might be more difficult in some other societies to collect meaningful data on the ownership of nonearned income for each individual in a family. For example, in a survey of rural Northeast Brazil, few women report nonearned income, though the proportion increases in urban areas.

At a more anecdotal level, there is evidence that as women's education and marketable skills improve, women are treated better and consume more of their family's resources. But there remain relatively few studies of household surveys from which to draw such generalizations. The neoclassical family demand model emphasizes that the human capital embodied in women affects their value of time and influences the allocation of time and investments within the family (Mincer, 1963; Becker, 1965). Consequently, evidence that time allocations, consumption, and investment patterns within the family respond to differences in male, female and child wages does not discriminate between the family demand and bargaining models. But the cooperative Nash-

bargained model of household behavior also predicts differential consumption effects of nonearned income depending on who controls it. The bargaining framework suggests why women may engage in separate jobs from their husbands to enhance their control over resources. Indeed, this pattern is particularly notable in subSaharan Africa and South East Asia (Schultz, 1988a), although women are still mostly working as unpaid family workers.

In parts of Africa husband and wife often cooperate in the joint production of some crops, while other crops or parts of the production process--e.g. marketing--are entirely the responsibility of one member. The neoclassical model of the family leads to the expectation that the wife allocates her time between the joint crops and her own crops to equalize the value of her marginal product across all activities. The bargaining model, however, predicts that she would work more on her own fields, because the value of her marginal product there is more under her control. Jones (1986) confirmed these predictions of the bargaining model with survey data collected from North Cameroon. Allocative incentives within these Cameroon families, therefore, may not achieve an overall efficient use of labor but advance other individual interests of family members.[7]

Another implication of the demand model is that the income-compensated cross-substitution effects should be symmetric or equal. This restriction of the unified family demand model implies in allocating labor supplies that the husband and wife agree on the value of each other's nonmarket time. It is possible to imagine, as an alternative hypothesis, that a husband would assign a higher value to his nonmarket time than does his wife to his time. In the case of their valuations of the wife's nonmarket time, the wife might also value her own time more highly than does her spouse. An individualistic

bargaining model should allow for the possibility that the wife and husband might value some "goods" differently, such as their own "leisures." Hence, a test of the family demand model is the strong restriction that the income-compensated effect of the husband's wage on the wife's nonmarket time is equal to the income-compensated effect of the wife's wage on the husband's nonmarket time. Heckman (1971) tested this statistically and rejected it with U.S. data, although this finding was not emphasized in a subsequent paper (Ashenfelter and Heckman, 1974).[8] But the test is conditional on many other aspects of the demand model, including functional-form approximations.

To evaluate the partial effect of the husband's or wife's nonearned income on household expenditure patterns, the wage rates of both partners must be held constant. If expenditure shares are analyzed, then an instrumental variable estimate of the family's total expenditures might be included as a proxy for the effect of permanent income. It is expected that increases in the wife's nonearned income share of total expenditures will have the partial effect of increasing expenditure shares on children's nutrition, health, and education as well as on her leisure. This assumes, however, that the wife's nonearned income has no effect on fertility, and the above variables representing investments in children are defined on a per child basis. Unfortunately, most expenditure surveys do not distinguish these child investment expenditures, e.g. child and adult health care are combined in a single coded expenditure category (Schultz and Thomas, 1988), and tests of this form are not yet reported.

The neoclassical family demand model, nonetheless, has the appeal of simplicity and widespread applicability, and some successful empirical application (Smith, 1980). How much realism should be sacrificed by a theoretical

paradigm to gain tractability and testable predictions is debatable. Perhaps in societies where nearly all women marry by age 30 and there is little dissolution of marriage, as was true until recently in Korea, China or Taiwan, the neoclassical model of the integrated family might prove satisfactory. But in much of Subsaharan Africa and South East Asia where men and women often have different sources of income and distinct responsibilities for the support of family consumption, individual interests may not be submerged in a "unified" family. The cooperative Nash-bargained model of McElroy and Horney (1981) appears to be a suitable model to structure research on family and individual behavior across societies, because it generalizes the neoclassical family demand model. It directs particular attention to who controls what assets and streams of income in the family, and may lead to new insights about how women's status influences the development process.

Measurement of Intrafamily Consumption Patterns

It is hard to evaluate systematically and comprehensively what individual family members consume. Many household goods benefit all members: one person's consumption does not diminish how much of such a "public good" is available to others. This property of public goods can be used to explain family formation (Lam, 1988). Children are often referred to as a marriage-specific investment or public consumption good, though the analogy has its limitations (Becker, et al. 1977). Economies in the scale of home production and public consumption are also difficult to disentangle empirically from the implications of public goods in the family. Both phenomena contribute to the gains from marriage.

Nonmarket production is also hard to track down in order to evaluate who in the family consumes what. Child rearing is the primary example of a family

nonmarket good that has some of the attributes for parents of a public good. For this reason most empirical analyses of intrafamily distribution of resources have focused on human capital investments in children, because such investments are largely produced by the family, are embodied in the children, and hence are subject to their future control, and are quantifiable in a survey. A family's investments in children account for a large part of a family's savings and intergenerational transfers. Three indicators of human capital investment in children are most frequently studied: mortality, anthropometric measures of child nutrition and health, and schooling. However, the number of studies examining gender differences in child mortality, health, and education in low income countries is still quite limited. A few economic studies must suffice to illustrate how gender differences can be interpreted within families to measure regularities in behavior that should inform policy-making.

Assume that survival rates of girls and boys, or those of women and men, are related directly to the relative contributions of women and men to their families' cash and kind income. In India, where female mortality exceeds male mortality (Visaria, 1971), as more women participate in the local labor market and are more productive relative to adult men, the survival of girls compared to boys is higher. This pattern can be observed at the district level in the 1970 Census of India among rural populations and also at the household level in parallel studies of representative rural sample surveys (Rosenzweig and Schultz, 1982a). A study in the Punjab (Anin and Pebley, 1987) suggests, moreover, that public policies that increase access to health services, without affecting the relative productivity of men and women, reduce general mortality, but increase the mortality rate of girls compared to boys after the

first month of life. This is when the health of children responds primarily to the family's allocation of food and health care. Similar patterns are noted in Bangladesh, Nepal and elsewhere in India (Chen et al., 1980, 1981; Marcorell et al., 1984; Bardhan, 1984; Sen, 1988).

In China, where social pressures have recently been focused on achieving a one-child family, the frequency of infant mortality appears to have increased disproportionately for girls (Aird, 1983; Zeng Yi, 1988). Perhaps as a consequence, rural families in China are allowed increasingly to have a second child if the first is a girl--the goal apparently being to reduce female infant mortality. The productivity and education of women has traditionally been far below that of men in China and continues to be in interior rural areas (Freedman et al., 1988). Indirect findings such as these suggest that economic productivity of persons in the family has a bearing on their share within the family of consumption and human capital investments. But the correspondence appears to weaken as the overall level of family income increases. Gender differences in nutritional status are smaller in studies of Nicaragua, Brazil, Philippines, Sri Lanka, and Ivory Coast (Blau, 1984; Popkin, 1980, Senauer et al., 1986, 1988; Strauss, 1986b; Thomas et al., 1987; Thomas, 1989) and may reverse in some regions of subSaharan Africa where women take an active role in the labor force (Svedberg, 1988). With increased wealth families appear to exhibit a preference for greater equality in nutritional investments within the family, at least between children by gender.

There is an analogous pattern across countries in the investments families make in the schooling of girls compared to boys. At low income levels investments in boy's schooling exceeds that in girl's. As real income per adult increases, public expenditures on schools per child tend to increase as

do enrollment rates. But the income related increase in enrollment rates among girls is significantly larger than it is among boys (Schultz, 1987) A catching up for girls is evident in both cross country comparisons at different stages of development and within countries as income increases. Equal educational treatment of boys and girls appears to be a "normal good" within the family, and as income per capita increases and reproductive goals are freely chosen, a variety of indicators of consumption and investment become more equally distributed between male and female family members.

Public policies sometimes are limited in their ability to influence the family's distribution of consumption because the family can, if it wants, compensate for them. A free school lunch program in Brazil or India, for example, leads to decreases in the family's supply of food to those children who benefit from the school feeding program. Part of the family's food that would have been supplied to the children in the program is apparently reallocated within the family to advance the family's own objectives. Nutritional intervention programs have had to take this into account (Chernichovsky and Zangwill, 1988).

There are more efficient ways to target resources transferred by public programs to specific uses in the family. The state could train individuals to accomplish their goal rather than contribute to the general pool of family resources or give the family income in-kind (i.e. food or health care) or transfer selected items for specific individuals to consume, such as school lunches. If public programs train women for vocational opportunities where they earn cash incomes directly, rather than through integrated (i.e. unpaid) family activities, the gain in women's productivity may shift consumption patterns toward women's priorities. Recent analyses of Brazilian data confirm

that nonearned income that is controlled by women has a larger effect on child health and nutrition than does nonearned income reported by men (Thomas, 1989). Empirical analysis of programs that encourage investments in women is needed to document what kind of changes occur in consumption patterns within families as the productivity of women is increased (Kennedy and Cogill, 1986; Blumberg, 1988).

The Composition of Families

One way that people express their demands for consumption patterns is in the form of the families they create. An increase in the proportion of households headed by women has recently been observed in many countries. It is frequently linked to the change in the jobs that women take, at least in the industrially developed countries and urban Latin America (Youseff and Hefler, 1983; Kniesner et al., 1987). One explanation is the increasing productivity of women compared to men in the labor market. Cross sectional patterns imply that increasing the level of male and female productivity and wages at the same rate is sufficient to increase women's participation in the labor market, reduce the frequency and onset of marriage, and diminish lifetime fertility (Layard and Mincer, 1985). These developments are hypothesized to have reduced the net gains from specialization of husband and wife in market and nonmarket production, respectively, within lifetime marriages (Becker, 1981). Though it has not been replicated in other U.S. social experiments, women who were given independent financial support for their children in the Seattle negative income tax experiment opted more often to separate from their husbands (U.S. Department of Health and Human Services, 1983). In those societies where women earn nearly as much as men, there are fewer marriages and more female headed households are enumerated.[9]

Individual data have also been analyzed to estimate the determinants of age-at-marriage among women. More educated women marry later, even in cases where marriage is sufficiently delayed in the overall society to avoid overlapping with school, as in East and much of South-East Asia (Montgomery and Sulak, 1988; Anderson and Hill, 1980; King et al., 1986). The growing tendency of young educated women to take paying jobs before marriage, financially encourages both them and their parents to delay their entry into marriage. Few studies have yet examined how local market demands for female workers affect the timing and length of marriage for women.

Evidence from Thailand suggests that the family bargaining model may help to understand variation in the prevalence of marriage in low income countries. Demographic and anthropological studies of Thai society document that marriage was until recently nearly universal. About 95 percent of men and women reported themselves as having been married (once) by age 35 (in the 1960 Census cited by Knodel et al., 1987; Table 5.1). An informal process of divorce has also been traditionally common with frequent remarriage (Smith, 1981). In the 1981 Socioeconomic Survey of Thailand 75 and 85 percent of the women and men, respectively, between the ages of 25 and 54 are living in the same household with their spouse. To explain who is currently married, the specialization argument as well as the bargaining model would suggest that marital gains would decrease with an increase in women's predicted wages and increase with an increase in men's predicted wages, other things equal. This pattern is confirmed for women's wages but not men's (see Table A-4). The bargaining model of the family suggests that the same pattern holds for nonearned income. If Thai women have unearned income this has a negative impact on their living with a husband. The ownership of nonearned income is associated among Thai

men with a greater proportion residing with a wife. But the estimated effect is nine times bigger for women than for men at similar levels of nonearned income (Appendix Table A-4). Marriage, it would appear, is not a "normal" good for women.

Other hypotheses could also account for these patterns of marriage and residence in the Thai data, and the available survey data do not distinguish among them. The death of a spouse could increase an individual's wealth through inheritance, and also transfer the individual to the "single" category. About half of the female headed households in Latin America are widows (e.g. Mohan, 1986; Rosenhouse, 1988). Alternatively, women might be more inclined than men, upon divorce, to move back into the household of their parents, other relatives, or children. Marital and residential histories with the timing of inheritance and transfers are needed to discriminate more adequately among these competing explanations for family formation patterns. Undoubtedly they will differ greatly as does the family in different societies.

Households Headed by Women: Multiple Causes

Comparisons of income and welfare of female and male headed households are not very informative. Most male headed households tend to include wives, while customarily few female headed households include husbands.[10] In some surveys the husband is treated as the household head even when he is not recently resident in the household.[11] Which women find themselves in families that are called "male headed" or in female headed households will be influenced by their resources and other opportunities, as in Thailand. Several studies have found an association between wealth of individuals and decreased frequency of divorce, separation, and death of spouse (Becker et al., 1977;

Peters, 1986). But the tendency noted in several parts of the world for the share of households headed by women to increase may be traced to a variety of sources, not all of which imply the same consequences. First, the increased longevity that occurs with development generally favors women compared to men. Improved health is associated, therefore, with an increasing fraction of women at the older ages. Households headed by the older women who have become widows and not remarried is a large proportion of all female headed households in Latin America and elsewhere. This group may not have children to support, and though their consumption, housing, and health needs are important issues, these groups also may benefit from accumulating inheritances and old-age support schemes.

Another source of the increase in female headed households in low income countries is migration, which affects women differently from one region to another. In Latin America, migration out of agriculture to the cities was led by women, as it was in Europe and North America. Urban job prospects for women were better than for men, and the ratio of women to men in some metropolitan areas of Latin America was as high as 1.2 in the 1960s (e.g. Gregory, 1986; Mohan, 1986). As a result, many urban women did not marry, but they are not necessarily disadvantaged compared to the conditions they left behind in the countryside. The prospects for women advancing in Latin America from urban domestic jobs--given their education--to ones in industry, commerce, and other services, appears favorable compared with men. The overall productive status of women relative to men is higher in the cities than in the countryside.

Unlike Latin America, migration flows in Africa were dominated by men, drawn (or driven) to the mines and plantations, domestic services and com-

merce, state enterprises, and government bureaucracies. Women remained on the land, often continuing to produce traditional food crops largely without the aid of modern agricultural inputs or technologies. African women suffered from lower levels of education than men, explaining in part why men were the first to migrate from the rural sector and were more successful in setting themselves up in urban businesses (Caldwell, 1968). In Africa, therefore, the high proportion of female headed households (de facto) is not associated with offsetting economic benefits for women. In both Africa and Latin America, however, the divergence of male and female migration streams has probably contributed to the relative decline in the two parent household, and to the growth of associated social problems.

There is widespread evidence that women have increased their educational attainment compared to men in most low income countries in recent decades (Schultz, 1986). Associated with these educational gains some data also confirm that wage rates and productivity of women have increased relative to that of men. Gains in the market productivity of women compared to men reduces the traditional spheres of specialization by women and men, and erodes the economic advantages of lifetime marriage (Becker, 1981). This development along with the increasing participation of women in the market labor force is another factor contributing to the increase in the proportion of female headed households.

Households headed by women generally report lower per capita income than those headed by men. Market income differences between male and female headed households may overstate the gap in welfare unless consideration is given to a broader concept of "full" income which also includes nonmarket production and time allocated to home production and even leisure. Even so, differences in

"full" income between male and female headed households warrant more study. There may be more children to support per adult in younger households headed by women than those headed by men (Youseff and Hefler, 1983; Preston, 1984). Changes in family structure are viewed as the choices of consenting adults, but society may be involved in the impact on third parties--in this case, children dependent on their mothers. If the physical and mental development of children is adversely affected by this shift in family structure, then society may wish to intervene to reverse the trend or compensate for its adverse consequences on children. If governments cannot ensure that fathers pay child support, whether or not they live with their child's mother, generalized social transfers to poor children may be an attractive alternative. Such transfers might alleviate depressed consumption levels in these families headed by women and thus advance the society's goal of equity. But direct aid of this form also encourages two-parent poor families to separate in order to better provide for their members. Targeted transfers to equalize consumption opportunities may weaken, therefore, the incentive to create or maintain the family which is a long standing institutional response to the consumption and production disparities among persons of different ages and sex. Policy to reverse trends in family composition can be adequately designed only with an understanding of the fundamental forces that have motivated more women and men to live apart. Little is now known about the magnitude, source or severity of this trend. Treating the symptom of the disease rather than dealing with the underlying cause within the family economic production-consumption system may be ineffective and possibly counterproductive.

3. Production and the Family

For the purposes of this survey, it is assumed that factor markets clear sufficiently regularly to ensure that market prices provide a satisfactory approximation for the shadow value of factors, adjusted for transactions costs (Singh, Squire, and Strauss, 1986). Many exceptions, of course, can be imagined, such as slack agricultural seasons when the labor market is thin, or interlinked factor markets where collateral or bullock power may permit their owners differential access to tenancies (Bell and Srinivasan, 1985). Labor markets, particularly for women and children, may not be perfect in all societies, and the demographic composition of the family's labor supply would then be expected to influence household production decisions. But the current evidence does not confirm that this market imperfection is important (Lopez, 1986; Seavey, 1987; Benjamin, 1988).

The family is engaged in many interdependent production and consumption decisions. The simplification that is widely adopted involves treating these two areas of decision-making as sequential, in order to analyze first the production problem as a profit maximizing stage, and then the consumption problem of what is consumed and by whom. Having explored in the previous section some aspects of the consumption and human capital investment decisions made within the family, the production problem facing the family is now analyzed. How does the family allocate its resources and time between (i) self-managed production at home or in the family farm or firm, or (ii) external factor markets, such as renting out family land or hiring out family labor for wages. If the family both sells some of its factors to the market and also uses some in its own production, the market price of the factor should be equated to the factor's return in self-managed production. For example, if a mother's time

is spent producing food and clothing for her family, that task is construed by the family as of at least the value to what she might have earned in the labor market, minus the transaction costs in terms of time and goods of her entering the labor force and any taxes that would be deducted from market earnings. If the value of the factor to the family's self-managed activity exceeds the market price, the profit motive ought to induce the family to hire in more of the factor than it initially owns, until diminishing returns set in, and the factor's return to the family is driven down to the market supply price. Thus, by clearing factor markets across families, market prices are expected to signal appropriately the social value of factors to all families. This value at the margin is also assumed to be a satisfactory measure of the contribution of each factor to the family's income or welfare.

Occupational Segregation and Discrimination

In some societies, there may be an additional cost to employment of women outside of the family household: customary restrictions on what is "suitable" work for women or the circumstances under which they work with persons outside the family. These barriers to the allocation of women's (and men's) time may at some stages of development serve some social purpose that outweighs the economic inefficiency that such rules impose. But when the workplace and people's work are changing rapidly,[12] the new productive opportunities, both in the home and marketplace, require changes in old rules of employment segregation of men and women. Otherwise, people may find themselves employed where they are not most productive. As these customary assignment rules become more costly to sustain in terms of their inefficiency or resulting lost family production, they may be retained only if preferences for them are inflexible or barriers restrain the development of alternative institutional arrangements.

For example, purdah requiring women to work in only sexually segregated settings, become increasingly inefficient when male and female labor are complementary in particular lines of production for which demand is growing. Inertia in occupational segregation may prevail in the short run, and as these traditional division-of-labor arrangements become increasingly counterproductive, the costs lower the welfare of families. If they penalize disproportionately women, it may be useful to ask at what point does segregation become discrimination? The answer may be important but very hard to clarify because it involves both cultural values and economic efficiency of entire institutional systems.

However, the mere existence of sex segregation in labor markets does not necessarily imply that these patterns are an important source of inefficiency or discrimination, though it presumably increases the costs of production during modern economic growth. Interventions should be based on sound empirical evidence that these arrangements result in a major misallocation of labor. For example, it might be shown that women's productivity in non-traditional work exceeds their output in traditional work (e.g. in families) where there is no joint production and the women in both sets of activities possess the same endowments and capabilities. Evidence of this form is hard to obtain, however, for two reasons. The product of women's traditional non-market activity is generally consumed directly within the household, and does not enter the marketplace, and is thus not valued in monetary terms that are comparable to market wage rates. There are also cases where women jointly produce several goods which are difficult to monitor and value. For example, the need to look after children may lead women to accept lower-paying jobs so that they have flexible hours and informal work routines that can be located

in the home or occasionally combined with home duties. Women might choose a better paying job in the formal wage labor market, if they were not also productively engaged in nonmarket family activities. This argument does not imply that women are biologically pre-disposed to look after children or even that nursing of infants cannot, at a cost, be rearranged to fit work routines of women in the formal sector (Blumberg, 1984; Friedl, 1975; Nerlove, 1974).

The conclusion of many observers is, nonetheless, that customary forms of sex segregation in the labor market in developing countries lead to a misallocation of woman's labor. The reduction of sex segregation in the labor market should raise current output and encourage investment by families in women (Rosenzweig and Schultz, 1982a). Devising mechanism that encourage poor families to invest more heavily in the market oriented skills of girls is a challenge to policy in certain parts of the world. Improving the operation of factor markets that discriminate between men and women as productive agents can also involve social costs, for interventions use economic and administrative resources that are very scarce in most low income countries.

Comparisons of Productivity in the Market and Home

Because of the difficulty of measuring and valuing nonmarket production, economists have focussed on the marketable component of income of families and individuals, including the market value of products or factors sold or exchanged, net of purchased inputs. Within this limited context, household surveys have found it notoriously hard to estimate the net return to self-employed entrepreneurs. Even surveys such as the Current Population Survey in the United States account for only about half of the National Income Account estimates of the value added by self-employed producers such as farmers. With far less sophisticated accounting procedures available in low income coun-

tries, extensive farm or enterprise management surveys are needed to measure current income comprehensively, along with changes in net worth.

Beyond these limits, economists strive to document the market value of goods produced and consumed at home, such as food, fuel, and housing, for which there are market priced equivalents. But nobody, to my knowledge, ascribes a market value to the fetching of water for family use, though conceptually it is no different from the collection of fuel, or the home production of food, all of which tend to be "women's work." In high income countries, as such forms of income in-kind have become an progressively smaller share of income they have been neglected. When this omission is replicated in low income countries, where income in-kind can be a large share of personal income, a serious distortion is introduced. This systematically affects one's perception of woman's contribution to the economy. It distorts the entire quantitative record of modern economic growth. Economists understate sources of income that are proportionately larger for poor families, and within families for women's earnings relative to men's (Kusnic and DaVanzo, 1980; Evenson, 1983). This partial accounting of income reinforces the view that women who engage in traditional household activities are less useful than they would be if they worked in the market labor force. From another perspective, per capita national income will appear to grow more rapidly than it should, if women allocate more of their time to the market labor force, because we make no offsetting debit to national income for the time women retract from nonmarket production that would otherwise benefit them and their families. Thus, statistics interject a subtle but pervasive slant into our study of modern economic growth and affect the choice of development policies.

Assessments of technical change can be distorted. If it boosts the pro-

ductivity of workers in the labor market it will be encouraged. If it promises only to raise the productivity of workers engaged in undocumented home production it may be overlooked. Public policies have probably shifted the gains arising from technical change toward workers in the market labor force rather than nonmarket workers, and toward men rather than women (Boserup, 1970; Blumberg, 1984; Ngwira, 1987). This oversight and distortion are corrected only when the quantitative importance of nonmarket and in-kind income is estimated, and its bearing on public sector priorities explicitly evaluated. Economic-demographic household surveys in low income countries that account for the productive use of time in both market and nonmarket spheres are beginning to change how we view women as a productive and innovative agent in the development process (e.g. Binswanger et al., 1980; Birdsall and McGreevy, 1983; Evenson, 1983; Gertler and Newman, 1988). Much work remains to be undertaken if the assessment of policies is to be neutral in its encouragement of nonmarket and market productivity.

Time Allocation and Labor Productivity

Microeconomic analysis of family behavior assumes that people allocate physical resources and time in response to the family's nonhuman endowments, the opportunity value of the time of each family member, and the relative prices of the family's potential market inputs and outputs. The market place sets the wage rate offered for various types of labor and thereby determines the marginal value of time for those working in the market or hiring in similar labor. This framework is readily extended to account for differences in fertility and human capital investments that add to the productive capabilities of family members. First the implications of the neoclassical unified family allocation model are restated, and then relaxed to allow for

differences in individual preferences within a more general bargaining framework. Extensions of this approach appear to have promise also for understanding women's changing roles in the economy.

As described earlier, the simplest representation of the family is as a unified decisionmaker, like an individual, but with several blocks of time to allocate, associated with different family members. This generalization of the neoclassical model of consumer demand and labor supply to a multiperson household has evolved in the contributions of Mincer (1963), Becker (1965), and Heckman (1971). It has become a suggestive tool for analyzing family economic and demographic behavior and has helped to account for numerous empirical regularities in both high and low income countries (Schultz, 1981, 1988d).

This framework helps to explain why the market labor supply of married men is relatively inelastic or even backward bending. Men, who are on average already working nearly full time, weigh more heavily than do women the negative "income effect" on labor supply due to any increase in their market wage rate. This may be only partially offset by the positive "substitution effect" associated with the increase in men's wages. For women, on the other hand, many of who are not yet in the market labor force, there are relatively few inframarginal hours to weight up the negative income effect. Consequently, the positive substitution effect of an increase in women's wages is more likely to prevail. Implicit in this distinction between a negative income and a positive substitution effect on labor supply is the expectation that if most jobs come with substantial time commitments, then the participation rate of women may positively respond to market wage offers, while women who already hold full-time jobs behave more like men and possibly even exhibit a backward

bending supply of labor, on average, in response to further increases in their wage rate (Schultz, 1980b).

There are good reasons, therefore, to analyze separately the decision to enter the market labor force and the choice of how many hours to work when participating. The analysis of both decisions together as though they were both generated by a single truncated process (i.e. Tobit model) may suppress distinctive features of the two decisionmaking processes.[13] Evidence of this pattern can be seen for Thailand in Tables A-3 and A-4.

To this individual market nonmarket time-allocation model of participation and hours, Mincer (1963) was the first to note that the earnings of a husband should increase the reservation wage of a married woman and thereby reduce her time allocated to the labor market. Symmetric treatment of both husband and wife implies that the wage rates of both are appropriate determinants of the labor supply function of husband and wife (Heckman, 1971).[14]

Empirical studies of the labor supply of married couples have found that the labor supply of men is relatively inelastic with respect to their own-wage rate and relatively unresponsive to variation in their wives' wage rate (actual or predicted). In the case of married women, market labor supply is elastic with respect to their own-wage and inversely related to the wage of their husbands. Because the own-wage elasticity is generally larger than that associated with her husband's cross-wage elasticity (in absolute terms), the net effect of a proportionate increase in the level of wages paid to women and men is to increase women's market participation. These response patterns are replicated in cross sectional data from many industrially advanced countries and from a substantial number of low income countries.[15] A general increase in the level of both men's and women's wages is sufficient to induce an

increase in women's labor force participation. According to these estimates of female labor supply, it is not necessary for the ratio of female to male wages to increase in order to induce more women to enter the labor force, though such a relative advance in female wages would of course accelerate the process.

Fertility and Investment in Children

In addition to family labor supply behavior, the pattern of consumer demands may be sensitive to variation in market wage rates available to men and women, particularly in the cases of consumption goods that require a disproportionate amount of the time of either the husband or wife to produce. The care of children in many cultures consumes much of their mother's time. An increase in the earnings potential of women's time relative to men's is likely to increase the money perceived to be lost by childbearing and child care, and thus to depress fertility, even though at the same time the woman's earning potential increases the family's income opportunities. Increases in wages of women relative to men, are generally associated not only with a reduction in fertility but also a reallocation of women's time from nonmarket to market work. On the other hand, increases in the labor productivity and wage rates of men and particularly children can enhance the attractions of a large family and are often associated with increased levels of fertility, at least in low income agricultural countries (Schultz, 1981; Levy, 1985).

The labor supply and fertility patterns predicted from this economic model of the family are based on the assumption that the nuclear family pools resources. Consequently, a married woman is assumed to rely on the earnings of her husband for the purchase of market goods consumed by her children and herself. Where wives engage intensively in economic activities oriented

toward market exchange as well as family subsistence needs, such as in rural subSaharan Africa, Thailand, and Malaysia, it is less clear whether the productivity and wealth of the husband are pooled with that of the wife to support equally all members of the family.

The family decisionmaking framework also addresses how the reproductive choice is linked to the amount of resources parents intend to invest in each child. Empirical evidence suggests that investments in child "quality" are an alternative for the numbers of children parents have, or more specifically, child quality is a substitute for the quantity of children. This conclusion does not follow from any general aspects of economic theory, as shown by Rosenzweig and Wolpin (1980). Economic theory does not prescribe whether any two goods are substitutes or complements; this relationship depends on production technology and people's preferences. But this limitation of theory does not diminish the usefulness of investigating how policies and price changes affect both child quantity and "quality" decisions of parents.[16]

Most models of family behavior call attention to the potentially distinct effects of the wage rates of the wife, the husband, and children on their economic behavior and on how many children the parents are likely to have (Mincer, 1963; Becker, 1965). Consumption that takes a large amount of the women's time is said to be an intensive user of her time and will be consumed in lesser amounts as the labor market opportunities for women increase in relation to those for men. If the rearing of children is such a female time-intensive household "commodity," fertility and the market productivity of women are likely to be inversely related across families and across societies and within societies over time. What we know from many societies about the allocation of time within families and the relationship between market wage

rates of men and women and fertility levels is consistent with these generalizations.

Increases in a couple's wealth adds to its economic opportunities, permitting it to consume more goods that do not have superior substitutes. Children seem to fall in this category. Nonearned income that is derived from nonhuman capital such as land and physical property tends, therefore, to be positively related to fertility, at least in traditional rural societies (Mueller, 1984; Schultz, 1988).

Land and physical assets that can be employed in home production may also enhance the productivity of child labor for parents, and encourage landowners in particular to have additional children. At the frontiers of settlement in North and South America, Scandinavia, and Africa, people with more land and less labor have tended to be relatively fertile, as noted by Malthus two centuries ago and reconfirmed in studies of low income countries today (e.g. Merrick, 1978). But these tendencies may be offset if wealthier parents are inclined to spend more on the human capital and property of their offspring, which may deter them from indulging in a larger family.

A critical, but largely untested, hypothesis is that the private returns on human capital increased in the last century throughout the world, and this development has encouraged parents to invest more in the "quality" of their children and less in the quantity of them (T. W. Schultz, 1967, 1974, 1975, 1981; Becker, 1981). Contemporary evidence does not contradict this hypothesis. But serious gaps in our knowledge prevent us from assessing how much of the observed decline in fertility can be attributed to this factor. Rarely is there documentation of how private rates of return on schooling have changed over time during the full course of the demographic transition. Nor is it

clear what caused the productivity of educated workers to increase initially, pushing up the private returns to schooling. Until such a forcing variable is isolated and measured, it is hard to confirm how it might have shifted the aggregate demand for educated labor and thereby affected fertility. But recent surveys provide a sounder basis for measuring contemporary private returns to human capital for girls and boys. These measures of returns for females and males may help to explain the patterns of human capital investments of parents in their children, and to forecast how the pivotal differences in wage rates between women and men will evolve in the future in response to changes in human capital investments.

Wage differentials between groups with different amounts of schooling are used to approximate private returns to schooling. Schooling may operate as a screen to identify innately more productive individuals, or it may, as assumed in the human capital literature, impart disciplined work habits and productive skills. The private returns associated with schooling, plus any consumer benefits, signal the rewards that individuals and families can expect to receive by investing in schooling, regardless of whether the wage differentials are due to screening or acquired skills (Schultz, 1988e).

4. Investments in Human Capital and Rates of Return

Labor productivity can be approximated by the wage rate people are paid. According to this measure, women are on average less productive than men in many labor markets (e.g. Schultz, 1986). However, comparisons of women's and men's wages may not be representative of the productive value of the time of all men and women for several reasons:

1. Many men and two-thirds of women do not report a wage because they do

not work for one (Tables A-5 and A-6). How the sample of wage earners is nonrandomly selected may bias intergroup comparisons, particularly if available wage data pertain only to a modern subsector of the economy, such as large manufacturing firms.

A first step toward a more accurate comparison of male and female wages is to identify the productive abilities of workers, as valued by what employers are willing to pay them. This information should help to assess how much of the gender gap in wages is accounted for by differences in abilities, innate or acquired, and how much remains unexplained. A large literature on wage and earnings differences has developed in the last 25 years to explore this question.

Estimates are obtained separately for men and for women of how productive characteristics of workers are partially associated with their wage rates. If the regression estimates of his hedonic wage function for men are cross multiplied by the average characteristics of women workers, a prediction of the average wage for women is obtained based on the male wage function. The observed gender gap in wages can then be split up into components related to the differences between men and women in each of the measured productive characteristics (Oxaca, 1973; Birdsall and Fox, 1985; Gannicott, 1986). There is no obvious reason to prefer the wage function coefficients for one gender as the basis for such calculations. Consequently, this form of regression decomposition of group wage differences yields two, equally tenable, answers, and hence a range of uncertainty.[17] Also, no matter how finely one distinguishes worker capacities, unobserved productive characteristics of workers and amenities of jobs in addition to statistical ambiguities will always inject substantial uncertainty into such adjusted intergroup wage comparisons.

2. Individuals who decide to work entirely in nonmarket (or nonwage) employment are likely to do this because they are more productive than the average person at it or less productive in market (or wage) work. Thus it would overstate the gender gap in labor productivity to attribute market-wage opportunities to women not in wage employment. The assessment might better focus on the shadow value of their time in nonwage work (Griffin, 1987).

3. Many individuals specialize during their lives in either market or nonmarket work, and marriage tends to encourage women to specialize in non-market activities (Becker, 1981). This increases the gap at later stages in the life cycle between the job opportunities available to married women and men in wage employment, if on-the-job experience is imperfectly substitutable between home and market jobs. Differences in market job qualifications between men and women are therefore narrower among young people than among the middle aged, although this tendency may vary from country to country as does the persistence of women's attachment to the labor market (e.g. Goldin, 1989).

Although the unobservables that might contribute to the first general form of sample selection bias could either widen or narrow the observed wage gap between men and women, the second and third sources of static and dynamic bias are likely to overstate the lifetime productivity gap between men and women if only market wages are analyzed. Moreover, these problems of comparing the productivity of women and men will not be easily resolved. The only direct solution is to assign commensurate value to nonmarket work in the home. Since some forms of nonmarket production are untraded, such as children, each family arrives at its own valuation, and this adds to the difficulty of comparing the labor productivity across groups of persons who do not work at all in the market labor force.

The major part of the private investment cost incurred in the formation of human capital is the time that the individual cannot be occupied in immediately productive work during the investment period, whether as a student, trainee, migrant, etc. To rank alternative investments in terms of their economic efficiency, the internal rate of return is a suitable criterion. For young persons, with many expected years of adult work time ahead of them, the percentage increase in average lifetime wages caused by an additional full year of human capital investment is a first approximation of the private internal rate of return to that investment of foregone earnings (Becker, 1969; Mincer, 1974). The opportunity cost of women's time to attend school may be lower than that of men's time, while the wage of female graduates may still be lower than male graduates. But the percentage gains in average wages associated with a specific year of schooling are not systematically lower for women than for men, as documented later. Second-order adjustments for other factors may raise or lower the private returns, from this wage differential without necessarily altering the comparison of private rates of return to schooling for men and women. For example, if students work part time at home or in jobs when they are attending school or during vacations, this relative wage differential associated with a year of schooling can overstate the student's time input to schooling and thus understate the private rate of return. Conversely, if school attendance imposes added costs on the child's household that exceed the value of his or her production outside of school, such as for the purchase of school clothes, books, and tuition fees, or to repeat grades, the apparent relative wage gain associated with a year of completed schooling can overstate the private rate of return.

There are, of course, many other limitations to intergroup comparisons

for estimating returns to schooling that are beyond the scope of this paper; they are discussed extensively elsewhere (e.g. Griliches, 1977; Schultz, 1988a). One is the inadequacy of statistical controls to take account of individual ability (i.e. omitted input bias or selection by comparative advantage) (Willis and Rosen, 1979; Heckman and Sedlacheck, 1985). Another is the neglect of school quality in the wage function, which because quality tends to be directly related to the quantity of schooling individuals receive, may overstate the returns to additional years of constant-quality schooling (Welch, 1966; Behrman and Birdsall, 1985). There is no consensus on precisely which variables should enter the wage function or how to statistically identify individuals who invest in schooling or work for wages in the labor force. Different strategies for constructing the comparison groups may imply private rates of return to schooling that are substantially lower, or sometimes higher, than the simplest logarithmic wage function that includes only years of schooling in linear form and a quadratic in years of post schooling experience (Mincer, 1974). Controversies involving the methods for estimating returns to schooling are, hopefully, less germane to my objective here, which is to compare the rates of return for women relative to those for men, rather than to assess precisely the absolute level of the returns to private and public resources invested in the education of women.[18]

Labor Supply and Rates of Return to Schooling

Several studies on returns to education by school level for men and women are summarized in Table 1. They are not entirely comparable. Several methodological problems and inconsistencies arise because of the different ways analysts have handled the effects of time allocation on the computation of returns, and the potential bias due to sample selection because analysts can

Table 1

Returns to Education by Sex and School Level: 1958-1985

Country (year of data)	Estimation Method[a]	Primary		Secondary		Higher	
		Male	Female	Male	Female	Male	Female
United States (1949)	I	17.8	5.6	14.0	13.0	8.7	4.2
Colombia, Bogota (1965)	II	18.2	nil	34.4	16.8	4.5	5.3
Germany (ca 1960)	b	••	••	••	••	4.6	8.0
Greece (ca 1960)	b	••	••	3.0	5.0	••	••
Kenya (ca 1960)	I	21.7	7.1	23.6	18.5	••	••
Malaysia (ca 1960)	b	9.4	9.3	12.3	11.4	10.7	9.8
New Zealand (ca 1960)	b	••	••	18.4	25.3	13.4	13.5
Brazil (1960)	b	17.9	38.6	••	••	••	••
Australia (ca 1960)	I	••	••	••	••	21.1	21.2
France (1978)	b	••	••	14.8	16.2	20.0	12.7
United Kingdom (1971)	b	••	••	10.0	8.0	8.0	12.0
Japan (1980)	I	••	••	••	••	5.7	5.8
South Korea (1971)	b	••	••	13.7	16.9	15.7	22.9
Taiwan (1982)	b	8.4	16.0	••	••	••	••
Puerto Rico (1959)	b	29.5	18.4	27.3	40.8	21.9	9.0
Andra Pradesh, India (1977)	II I	8.9 7.2	11.8 .3	8.7 6.8	11.9 2.41	6.2 5.5	8.9 5.5
Ivory Coast (1985)	II	18.3	5.3	17.0	28.7	21.1	13.6

[a]Estimation Methods: I - include participation rate in labor force to deflate returns, depressing female returns disproportionately; II - estimate wage rate relationship without labor force adjustment. See text for discussion.

[b]Estimation method not known.

•• Not reported.

Source: Psacharopoulos, 1973 (Table 4.5), 1985 (Table A-2), except for India (Tilak, 1987: Table 6.8). Average return; Ivory Coast (Van der Gaag and Vijverberg, 1987: Appendix 2); and Colombia (Schultz, 1988: Table 7) hourly wage.

only observe differences in wages for a portion of the population receiving different amounts of education. In the first studies of the association between education and labor earnings, private rates of return were calculated under the assumption that the more educated benefited from schooling only to the extent that they held a job in the labor force and reported earnings.[19] Thus, if a year of additional schooling raises the wage rates of men and women by the same proportion and they both work full time in the labor force, then the life-cycle internal rate of return to the opportunity cost of attending school for that year is approximately equal to the proportional wage increment, and the return is then identical for men and women. But if women worked only half of the time in the labor force after completing their schooling while men worked all of the time, the conclusion was drawn that women earn only half of men's rate of return on their year of schooling.

Becker (1964), in his seminal contribution on this subject, observes that the lower return to women's education due to their lower participation in the labor force is consistent with the smaller proportion of women than men attending college in the United States in the 1950s (Becker, 1964: 178). Subsequent empirical studies and surveys of the field that specifically addressed male-female differences in rates of return to education adopted Becker's methodology (Hines et al., 1970; Thais and Carnoy, 1969; Psacharopoulos, 1973; Woodhall, 1973). The implicit assumption of these researchers was that schooling had no appreciable effect on the productivity of persons working outside of the market labor force.[20] But this assumption has subsequently been challenged by a large number of empirical studies that indicate education increases the productivity of time in nonmarket production, particularly that of women (summarized in Michael, 1982; Haveman and Wolfe,

1984). Moreover, the opportunity cost of the time of females while attending school are not symmetrically discounted; girls are implicitly assumed to be giving up a full-time job in the labor force to attend school, which may not be the case. These working assumptions for estimating the rates of return bias down the rates of return to groups, such as women, who participate in the labor force less than average amounts or work more often as an unpaid family worker.

A second possible working assumption is that education affects labor productivity in market and nonmarket work to the same extent, and consequently the allocation of an individual's time between market and nonmarket activities is not biased by his or her education. According to this approach the returns to education are approximated by estimating a function where the logarithm of the wage rate is the dependent variable. This approach differs from that adopted by Becker (1964) and Mincer (1974) which examined differences in annual earnings, and thus mix together the productivity enhancing effect of schooling with its possible effect on market labor supply. It is an empirical fact that unemployment rates tend to be lower among more educated workers once they have reached age 25, and a common pattern, though far from universal, is for hours worked when employed to be larger for more educated workers. Consequently, rates of return to schooling are sometimes higher if based on the logarithm of annual earnings as the dependent variable rather than on the logarithm of the hourly wage rate.

Becker's neglect of nonmarket productivity effects of schooling introduces a downward bias to the estimated rate of return to education for groups who do not all participate in the market labor force. But the direction of potential bias due to the second approach based on the estimation of a wage

rate function is ambiguous; it could overstate or understate the appropriate rate of return for the entire population. Either approach should deal with potential sample selection bias (Heckman, 1979; 1987). Statistical techniques have been widely used to correct for this source of parameter bias. They can be employed here if an identifying variable, observed for all persons, influences the probability of entering the labor force but does not affect at the same time the market wage rate a person is offered. In other words, information must be known about some exogenous determinant of the person's productivity or value of time in nonmarket production that does not affect her or his labor productivity to a firm. This critical information permits one to correct the estimates of the market wage-rate function for the potential statistical bias introduced because market wage rates are only observed for the selected sample of persons for whom the offered market wage exceeds the value of their time in alternative nonmarket activities.

Theoretically, the variable needed to identify the nonmarket productivity (or reservation wage) function is a household fixed productive factor that affects the individual's nonmarket productivity, but does not alter his or her labor productivity in the market. In the short run, children have been viewed as such a variable raising a woman's productivity only in the home (Gronau, 1974). But over the life cycle, this variable is also jointly determined and responsive to labor market wage rates, and thus, should be viewed as endogenous or determined within the same framework. Land ownership and family business assets and the market productivity of one's spouse may be more satisfactory measures of fixed household endowments that enhance the value of an individual's time in nonmarket activities. The choice of this identifying restriction determines how the estimates of the market wage function are

interpreted and hence whether the implied private rate of return to schooling is a satisfactory estimate for the entire population or for only the nonrandom sample of wage earners.

If more than one selection process is used to screen the observed sample, and the selection processes have different determinants, multiple sample selection equations and corrections may be appropriate (e.g. Catsiapis and Robinson, 1982). For example, participation in the market labor force, and acceptance of wage employment may respond to different home and market constraints. If the marginal product of labor is measured with less error for wage and salary workers than for self employed workers, this scheme of double sample selection may be appropriate, to reduce measurement error, despite the loss in final sample size that is implied by estimating the market productivity of all persons from only wage earners.

Most recent studies of the returns to education tend to include only wage earners and thus to exclude the self-employed and unpaid family workers for whom a wage is difficult to infer or measure precisely. This omission represents a relatively small segment of the labor force in high income countries, but it is a major part in low income countries. Nonmarket workers, the self-employed, and family unpaid workers together represent about half of the adult male population of the world, and two thirds of the adult female population (see Tables A-5 and A-6). Thus, any bias from sample selection could be important for the analysis of educational returns to men as well as to women.

Table 2 summarizes private rates of returns to years of schooling for men and women in several Latin American countries. A common conceptual and statistical methodology is adopted in all of these studies (Schultz, 1980b). Although these estimates deal plausibly with the labor supply issue, by using

Table 2

Estimates of Private Returns, in Percent per Year, Which Men and Women Earn on Investing Their Time in Schooling, in Selected Labor Markets and Years[a]

Country and/or Metropolitan Area	Year of Survey	Internal Rate of Return in Percent per Year Age 25-44		Age 45-65	
Argentina, Buenos Aires (estimates similar in 1976)	1980[b]	9.3	6.6	10.	11.
Bolivia, La Paz (estimates similar in 1976)	1980	9.8	11.	9.6	6.7
Brazil, Sao Paulo (estimates higher in 1980)	1971	5.4	6.3	6.0	6.1
Colombia (estimates lower in 1980)	1973	18.	18.	16.	14.
Paraguay, Asuncion (estimates similar in 1977)	1979	11.	8.0	10.	11.
Peru	1974	14.	14.	11.	19.

[a]Private returns refer to the estimated coefficient (times 100) on the variable years of completed education in a logarithmic hourly wage rate regression which also includes post-schooling experience, experience squared, and some regional or migration origin variables. Samples vary from 21 to 3478, but all estimates are statistically significantly different from zero at the .001 confidence level ($t > 2.83$). The selection of the sample of only workers in the labor force for whom wage rate could be calculated is not treated as a specific source of bias in these estimates.

[b]The available age groups in Argentina are 25-49 and over 49.

Source: Schultz (1988c).

the hourly wage, they do not attempt to correct for analyzing only wage earners. Because the samples are small, some of the estimates are imprecise. Overall, however, there is no clear evidence that returns to schooling differ systematically by sex. They do differ considerably across countries, however, presumably because of differences in macro economic conditions and the level of past investments in schooling (Schultz, 1988e).

An analysis of the returns to education in Andra Pradesh, India illustrates how sensitive the return calculations are to the treatment of the labor force participation rate of women (Tilak, 1987). Both the private and social returns to schooling at virtually every level are greater for women than men when the returns are adjusted only for unemployment. But when nonparticipation in the labor force is also factored into the calculation as Becker proposed, the private rate of return for women is less than it is for men (see next to the last two rows for Indian study in Table 1). This study also documents the lower public cost of female than male education, and the lower opportunity cost of time for female than male students. However, the adjustment for nonparticipation of women is not introduced to deflate the opportunity cost of female student time but only to deflate the stream of benefits.

A study of Sri Lanka also confirmed that women's returns to schooling that are not deflated by nonparticipation rates exceed those of men. The private rate of return to completing the general certificate of exams at the end of the secondary school are three times as high for women as for men in urban areas (36 versus 13 percent), and twice as high in rural areas (14 versus 7 percent). At the university level, however, the rates of return in Sri Lanka appear to converge between men and women (Sahn and Alderman, 1988: Table 17).

Fixed-effect estimation procedures can eliminate bias that may arise from certain types of unobserved or omitted variables in a relationship. A cross section is drawn from a number of distinct localities, for which price and quality for market goods and public services may differ. If these local market variables influence the productivity of schooling or its quality, then this local variable should be controlled to estimate the returns to varying only years of schooling. In this case introducing a fixed effect for every school district into the wage function removes any bias due to the omission of school quality that might be correlated with quantity of schooling received. Clearly, the effect of other local market variables cannot then be estimated when community fixed-effects are included. If the local school quality changes over time or individuals in a school district move or attend more than one school, the community fixed effect is a less adequate control for school quality.

It is also reasonable to expect that family background influences average ability through genetic and environmental mechanisms, instilling motivation and habits, as well as influencing the quality of schooling that siblings receive. If these family background characteristics affect productivity and are correlated with years of schooling, their omission from the wage function would also bias upward (in all likelihood) the estimated rate of return to schooling. One strategy for dealing with these unobserved characteristics is to introduce fixed effects for each family and thus base the estimates of schooling returns on only within-family variation in worker productivity. However, this procedure may increase the relative importance of measurement error by eliminating all between-family variation. Exaggerated measurement error would bias the within household fixed-effect estimates of schooling

returns to zero (Griliches, 1977, 1979). Household fixed effects, therefore, may represent a lower bound on the estimates of the market productivity effects of schooling. It has not, to my knowledge, been examined how the restriction of the estimation sample to those residing with other wage earning family members distorts the comparison group and thus potentially biases the return estimates.

Private rates of return to schooling have been estimated for men and women from a 1986 survey of Indonesia that compare ordinary estimates of the wage function to those that include both community fixed-effects (proxy for school quality, etc.) and household fixed-effects (proxy for family background correlates) (Behrman and Deolalikar, 1988b). Three increments of schooling are compared in Table 3: primary, general senior high school, and university. Private rates of returns to schooling for women in all six comparisons exceed those for men, and as expected the estimates that include community and household fixed-effects are between 9 and 24 percent smaller than those obtained from the simple regressions that include inter-family and inter-community variation. These estimates do not attempt to control for the potentially unrepresentative character of the sample of wage earners, nor are the two sets of estimates based on the same sample, since 16 percent of the wage earners included in the first set of estimates apparently did not reside in a household with another wage earner and is therefore excluded from the fixed-effect estimates (Behrman and Deolalikar, 1988b: Table 3). Differences in the private rates of return estimated for women and men in Indonesia change moderately as fixed effects are added for the community and household, with the difference decreasing at the primary school level and increasing at the university level.

Table 3

Implied Impact of an Additional Year of Schooling in Indonesia in 1986 by Sex, With and Without Controlling for Both Community and Family Fixed Effects

	Implied Private Return by Schooling Level[a]		
	Primary	General Senior High	University
Females:			
Without fixed-effect controls	8.1%[b] (21.1)	11.8%[b] (43.4)	12.4%[b] (27.8)
With community and family fixed-effects	6.8%[b] (17.3)	8.6%[b] (35.3)	10.8%[b] (24.7)
Males:			
Without fixed-effect controls	7.6%[b] (2.84)	8.2%[b] (10.8)	8.2%[b] (6.41)
With community and family fixed-effects	6.1%[b] (1.43)	6.2%[b] (10.8)	8.4%[b] (5.23)

[a]A logarithmic monthly earnings function is estimated pooling men and women that includes dummy variables for nine levels of schooling and a quadratic in age. Parameters are estimated for the difference between male and female coefficients for all variables including the intercept. The community and household fixed effects are believed to control for possible school quality variation and the effect of family background on earnings (see text). Unfortunately the ordinary regression estimates and those including the fixed effects are for different samples as noted in the text, raising the possibility that the differences reported may be due to the different samples and not due to the introduction of the fixed-effect controls.

[b]The absolute value of t ratios are reported in parentheses beneath the coefficients in the case of female returns, and for the difference between the male and female regression coefficients beneath the male returns. Thus a significant t ratio under a male return, e.g. secondary, suggests that the rate of return on schooling for men and women differ by a statistically significant amount in this pooled earnings regression.

Source: Behrman and Deolalikar, 1988b: Table 2.

Chiswick (1976) developed a technique to include self employed workers in the estimation of an annual earnings function along with wage earners, and thereby avoid the selection bias due to analyzing only wage earners. Her approach attributed a share of self employed earnings to entrepreneurial capital or risk taking. Based on an analysis of Bangkok from the 1971 Socioeconomic Survey of Thailand, male wage earners (not self employed at all) received a 10.4 percent return on their years of schooling, whereas females received a 14.5 percent return. Including partial and full-time self employed in the sample reduced slightly the returns to schooling to 9.1 percent for men and to 13.0 percent for women. The urban estimation sample increased by 39 percent for males and by 53 percent for females with the inclusion of the self employed. In both cases, women's returns exceed those for men, but those who are self employed report slightly lower returns on their schooling than do wage earners. This is broadly consistent with the pattern of more educated women (beyond primary school) working more frequently in wage jobs than the less educated. It is uncertain whether underreporting of incomes by self employed biases such estimates of return to schooling and by how much.

There are few studies of the relationship between wage rates and schooling that assess how the selective sample of wage earners biases findings (e.g. Anderson, 1982; Mohan, 1986; Griffin, 1987; King, 1986; Schultz, 1988c). Moreover, these studies often deal with men alone or women alone and thus do not help assess whether the bias due to sample selection modifies systematically comparisons of male-female estimated returns to education, as reported in Tables 1 and 2. Here is an important issue for public policy that has received surprisingly little empirical study.

Griffin (1987) analyzes the earnings of married women in the Philippines

in 1980 to appraise estimates of schooling returns subject to alternative methods for dealing with sample selection bias. He estimates a nonmarket (reservation) wage function and a function for market wage offers. The reservation wage function determines the shadow value of nonmarket time of the individual, and hence what the individual requires to induce him or her to enter the market labor force. The selection-corrected model of Heckman's is plausibly identified within the context of the family or bargaining labor supply model. A conventional log linear specification of the earnings function is estimated where returns to schooling are constant across schooling levels.[22] The selection-corrected maximum likelihood estimate of schooling returns is 18 percent, compared with the conventional estimate of 14 percent (based on only the third of the sample who earn wages). In this case the estimated returns to schooling increases for women with the adoption of a sample selection procedure, and the selectivity term is statistically significantly different from zero, showing that the sample of wage earning women are not a random sample of the population with regard to their wage rates.

King (1986) analyzed the earnings of women in the 1985/86 Peruvian Living Standard Survey. A probit equation for women participating in paid employment (i.e. wage earner or self-employed) is used to estimate an hourly earnings function with Heckman's (1979) two-stage procedure. When the sample selection correction is employed, the rate of return for women decreased trivially from 12.2 to 12.0 percent for primary schools, from 8.0 to 7.8 percent for secondary school, but from 6.8 to a -1.7 percent return at the university level (if a diploma is received after four years of study) (King, 1986; Tables 10, 11 and 12). As in Griffin's study, the family's nonearned income and husband's characteristics are included only in the paid-participation equation, along

with the woman's marital status, plus a variety of more controversial identifying variables.

Khandker (1989) has subsequently examined the returns to schooling for both men and women based also on these Peruvian LSS data. He restricts his analysis to wage earners and identifies the sample selection probit equation by the family's land holdings, unearned income, as well as possibly the individual's marital status and the education of his or her mother and father. The return estimates appear to be relatively robust to variations in this list of identifying variables included only in the sample selection equation. For the country as a whole, women's returns increase when controls are introduced for sample selection, and returns are then marginally higher for women than for men at the secondary and higher schooling levels. At the primary school level in the metropolitan area of Lima, however, the returns are low, and lower for women than for men, 2 percent compared to 5 percent. This low level of private returns to women at the primary level is perhaps related to the frequency of domestic servants in this group, preponderantly women, whose income in kind (food and lodging) is difficult to evaulate and is often omitted from survey reports of wages. The same pattern has been noted elsewhere in metropolitan Latin America (see Schultz, 1968) and has led some researchers to exclude domestic servants from samples in estimating wage functions (Mohan, 1986).

The 1981 Socioeconomic Survey of Thailand provides another basis to evalute the effect of sample selection bias on the estimates of private rates of return to schooling for both women and men. In this case two selection correction terms are incorporated into the analysis representing the probability of being in the labor force and being a wage earner. These selection

equations include family nonearned income, hectares of land owned by the family that are irrigated or unirrigated, plus the standard market wage rate determinants, including years of schooling completed at the primary, secondary, and higher education level.[23] Land and nonearned income are assumed to raise the nonmarket reservation wage of workers and thereby reduce the likelihood that they will take a wage job or work at all in the market labor force. Education does not exert a monotonic effect on the labor force and wage earner status of Thai men or women (see Appendix Tables A-7 and A-8). An individual with primary schooling is less likely to be a landless laborer. The more years of secondary schooling an individual has, the higher are the chances that she or he is working for a wage. Each year of university education strongly increases the likelihood of working in a wage or salary job. Herein is the clue why the sample selection bias can also be nonmonotonic with respect to level of schooling. Many landowners are also wage earners. If they have enough land, however, they presumably withdraw from the wage market. The controversial issue is whether land is exogenous or merely a proxy for self-employment, in other words, is land a legitimate variable to use to identify the selection model.

A final problem in specifying a wage function to estimate returns to education is how to model regional labor markets. If there were no interregional migration, wage functions should be estimated separately for each region. The wage differences related to education within a region would then be the appropriate parameter determining private investment in schooling in that closed regional population. But interregional migration occurs and more educated persons migrate more frequently. On balance, they move from lower to higher wage markets, and from rural to urban areas (Schultz, 1982). In Latin

America, for example, as much as half of the lifetime returns to schooling for the children of rural residents is realized by the increased likelihood that the children will migrate from the rural to the urban labor market (Schultz, 1988e). One could analyze this process if one knew where people migrated from, the costs they incurred in moving and where they received their schooling. Alternatively, if the individual's current residential regional labor market is held statistically constant in estimating a wage function, this procedure purges from the estimate of the return to schooling that component due to migration, to the extent that interregional migration toward higher wage regions occurs with increasing frequency for the better educated, as it clearly does in Latin America and the United States (Schwartz, 1976).

Finally, regional labor market nominal wage differences may reflect compensating variation in price levels and reinforcing variation in the quality of subsidized public services, and thus not measure accurately real wage differences. Urban high wage regions have more and better schooling, and regional shift variables in a wage function may also reflect this difference in the quality of schooling across workers (Behrman and Birdsall, 1983). Other than school and health services, most other prices are generally higher in urban high wage regions, particularly housing. On balance, nominal regional wage differences may exceed real wage differences, if public services are unimportant. Estimating the participation and wage functions with and without regions as explanatory variables should at least help to assess the importance of migration in the estimation of school returns. The lack of information on migration in the Thailand survey data does not permit any further analysis of this issue here.

The selection-corrected private rate of return estimates are contrasted

Table 4

Estimates of Private Rates of Return to Schooling in Thailand in 1981 by Sex, With and Without Sample Selection Correction

	Private Internal Rate of Returns by Schooling Level[a] (t statistics beneath coefficient)		
	Primary	Secondary	Higher
Females:			
Without Correction for sample selection of wage earners (OLS)	5.2% (2.70)	34.2% (22.1)	1.6% (.55)
With correction for sample selection of wage earners (two stage Heckman)	10.0% (5.00)	24.7% (6.77)	10.8% (3.04)
Males:			
Without Correction for sample selection of wage earners (OLS)	15.5% (9.98)	23.9% (20.9)	5.4% (2.16)
With correction for sample selection of wage earners (two stage Heckman)	14.3% (8.95)	13.1% (9.04)	4.1% (1.66)

[a]The private rate of return is approximated by the coefficient estimated on the years of schooling variable in a logarithmic wage rate regression that also includes as regressors the individual's years of postschooling experience and experience squared, and four regional dummy variables. The sample includes all persons 15 to 49 in the 1981 Socioeconomic Survey of Thailand. The Heckman (1979) lambda correction terms are included from probit equations for labor force participation and for wage earner status, identified by the inclusion of own nonearned income and irrigated and nonirrigated land.

Source: See Appendix Tables A-7 and A-8.

in Table 4 with those based on the ordinary least squares (OLS) estimates for wage earners that ignore the potential bias due to the selection of the sample of only wage earners. The two-step estimation procedure proposed by Heckman (1979) for dealing with selection bias is identified by the inclusion of non-earned income and hectares of irrigated and unirrigated land owned in the two selection probit equations that predict the probability that the individual is in the labor force and is a wage earner. Both the wage function and the two selection equations differ in level across five regions of Thailand: the least developed Northeast region, the rural population, the suburban sanitary districts, the urban municipal areas, and finally Bangkok. The gains that accrue to education through the more frequent migration of more educated persons from regions of lower wages to ones with higher wages are, thus, excluded in these estimates of the private returns to education, because regional shifters are specified in the wage function.

Thailand has for most of this century invested heavily in primary education. Still, it enrolls a smaller proportion of its population in secondary schools than do other countries at a similar stage in their development, such as South Korea, Taiwan, Philippines and Malaysia or the two city states of Hong Kong and Singapore (Sussangkarn, 1988). On the other hand, the proportion of the Thai population enrolled in higher education is relatively large for a country at its income level. The relative supply of workers by educational level would lead to the expectation that in Thailand the returns to education would be relatively high at the secondary level and relatively low of the university levels, compared to other countries at Thailand's stage of development (Sussangkarn, 1988).

Table 4 shows that if one ignores the potential problem of sample selec-

tion, because analysis of labor productivity relies on analyses of only wage earners, the private rate of return to primary education is 5 percent per year for women, 34 percent to attend secondary school, and 2 percent to university education. For men the OLS primary school returns are 16 percent, secondary school 24 percent, and university education 5 percent. The statistical correction for the two sample selection processes that might render these estimates biased modifies the estimates markedly in four out of the six cases. Three out of four selection terms are statistically highly significant (Appendix Tables A-7 and A-8). The returns to primary education for women doubles to 10 percent, whereas the returns to secondary school decline for both women (to 25 percent) and men (to 13 percent). Higher education private returns increase to 11 percent for women and decline for men to 4 percent. Although much more work is needed to assess the effect of alternative methods to deal with sample selection bias as it impacts on the returns to education of women compared to men, these data from Thailand suggests the levels of returns to schooling may be sensitive to this source of bias. In this instance, returns to women's schooling increase compared to the returns to men's schooling.

In concluding this section on measuring labor productivity and the returns to investing in the economic capabilities of either women or men, I should stress the need first to understand what underlies the individual's allocation of time. This is required to correct analyses of wage earners from which one seeks to infer the effect of investments in schooling on the productivity of all workers. A potential bias is introduced by the process. This sample selection correction procedure depends on the relevant family unit and how family behavior is modeled. The bargaining model implies a few, pos-

sibly useful, differences in the empirical specification of the family labor supply model from that implied by the unified family demand framework. But on the whole, both models require similar variables for inclusion in the wage function and for identification of the sample selection rule. Conclusions drawn from this section are likely to be robust to changes in how we model the family decisionmaking process.

Social and Nonmarket Returns to Schooling

Social returns to schooling are traditionally calculated by including public expenditures on education in addition to the private opportunity costs of the time of students. Hence, social returns are lower than private returns, often by between one-third and one-fifth. This adjustment should not affect comparisons between returns to women and men, unless the public resources employed in teaching women and men differ. In Latin America, this may be the case. Much of the higher education received by women is in preparation to be school teachers in "normal schools," for which student costs per year are less than in regular academic universities (e.g. Birdsall and Fox, 1985). This is also noted in India (Tilak, 1987). In this case, including public costs of education could decrease the social returns from schooling by a greater amount for men than for women.

If governments tax labor earnings and hence the returns to human capital, some of the public expenditures on education, health, etc., will be recovered. Only market returns, however, are taxable, and of them only the returns to wage and salary workers are effectively taxed in most low-income countries.[24] The tendency for more men than women to work for a wage might appear to provide a differential social return via taxes that would favor social investments in the schooling of males over females (Tables A-5 and A-6). But a more

complete answer to this question requires an analysis of how labor supply to wage employment responds to a change in market wage offers (after taxes). Most empirical labor supply studies in high- and low-income countries indicate that women respond positively to an increase in their own market wage, and negatively to a wage increase of their husband. Consequently, the taxable supply of women's labor increases with an investment in women's capabilities and decreases with a comparable investment in men's capabilities. Moreover, male labor supply estimates often reveal a tendency for men to reduce their labor supply as their own wages rise.[25] Thus, to the extent that governments recoup public expenditures on human capital investments, the social return to investing in women should increase relative to those from investing in men.[26]

A more generally accepted rationale for public expenditures on education of both men and women is that there are social benefits to an educated population that increase welfare in a manner that cannot be readily captured by the more educated individual or their families. This argument for public support of education suggests that a more educated society is more capable of managing a political system that protects individuals' rights and facilitates efficient and equitable growth.. Though these claims are difficult to substantiate, there are more concrete examples that have been empirically confirmed. Most of them favor the schooling of females.

Determinants of Child Nutrition and Mortality

Studies in the 1970s and 1980s in demography, economics, anthropology and sociology came to the conclusion that there was a strong, probably causal, relationship between increases in mother's schooling and decreases in the incidence of mortality among her own children, particularly in low income countries (e.g. Basu, 1987). Many hypotheses are offered as to why this correlation is observed, some of which are discussed below (e.g. Ram and Schultz, 1979; Barrera, 1988). The patterns is widely replicated because many fertility surveys provide the minimum data on women: their age, education, children ever born and children still living. The universality of the relationship is reminiscent of the discovery in the 1960s of relative (logarithmic) wage differentials associated with the years of schooling. The human capital interpretation of these latter wage-education differentials as an approximation of the private rate of return to schooling has gradually gained acceptance (Schultz, 1988e).

In the case of child mortality, an added year of maternal education is associated with a 5 to 10 percent reduction in child mortality. Although the level of mortality tends to be higher in rural than in urban populations of low income countries, the proportionate reduction in child mortality associated with an additional year of mother's schooling is of a roughly similar magnitude in both urban and rural areas of many countries (Cochrane et al., 1980). The proportionate mortality reducing effect is smaller for the father's schooling than the mother's, especially in rural populations (Mensch et al., 1986). Studies in Latin America have also noted that the child mortality differentials associated with maternal education are more moderate in Costa Rica and Cuba. The hypothesis advanced to explain these exceptions is

that these country's strong egalitarian public-health programs could improve access and use of health care even among the least educated mothers (Behm, 1980). Other economic hypotheses for the differences in the relative magnitude of schooling effects on child mortality are analyzed in Colombia (Rosenzweig and Schultz, 1982b), and discussed generally elsewhere (Schultz, 1984; Thomas et al., 1987).

Is education simply correlated with the use of more health inputs, or does education provide a mother with the capacity to cope with health risks and better manage her child's environment? In Colombia an analysis of the 1973 census indicated that controlling for household income or husband's education or the marital status of the mother did not eliminate or even greatly reduce the independent role of mother's education as a partial explanation for her children's survival (Schultz, 1980a). Studies elsewhere showed that it was possible to control for many lifetime events and changes in socioeconomic status in relation to child mortality rates and still mother's education had its effect (Farah and Preston, 1982). In Brazil a third of the mother's education effect seems to operate through family income (Thomas et al., 1987). However, in addition to influencing child mortality, mother's education undoubtedly influences many of these intercorrelated variables, such as migration, labor market behavior, use of health care, and modern attitudes. Therefore, to control statistically for all these types of variables is likely to understate the net effect of schooling (Mensch et al., 1986).

The puzzle remains why mother's education explains more of the variation in child mortality than other variables describing the individual's access to health care, or prices, or even total family income that could be spent on health care? Three competing hypotheses are (1) that the more educated mother

uses a different mix of observable health inputs, or (2) that she uses these inputs more effectively, or (3) that her education is positively correlated with the use of unobserved health inputs and her education is credited with the effect of these unobserved inputs on child health (Schultz, 1984).

Clearly, the mother is the most important health worker for her children. How well she performs this task appears to depend "on her schooling, which equips her with general and specific knowledge, and the means and confidence to seek new ideas" (Barrera, 1988b: p. 4). The challenge is to discover how education influences the use of health inputs to reduce the probability of child mortality. Because relatively few children die in middle and high income countries, a more widely distributed or continuous indicator of child health status is sought to extend and broaden the analysis. Weight of a child is often recorded at birth and provides a sensitive predictor of child mortality as well as lifetime health problems and mental and physical developmental handicaps. The self-selected health inputs of pregnant women must be analyzed as endogenous variables if one is to estimate the unbiased effect of these inputs on the production of child health (Schultz, 1984). Selection of some health inputs occurs in response to the mother's expectation of a good or poor birth outcome, and consequently the simple correlation between these self-selected inputs and health outcomes may be misleading. Seeing a doctor early into the pregnancy is correlated with having a lower birthweight child, whereas administering the same health input to an average woman exerts a positive effect, holding constant the initial (but generally unobserved) health condition of the mother and child. In a U.S. study, the effect of mother's education on birthweight in 1967-69 and in 1980 appeared to be transmitted largely through the variation in the same four measured prenatal inputs

(Rosenzweig and Schultz, 1988).

It is probably a more difficult task to measure all or even the major inputs that play a role in producing good nutrition, good health, sound development, and survival in an older child. A statistical explanation must also be found for which mother use each of these health inputs, if the effect of these inputs on the production of child health is to be estimated without input self-selection bias. It is simpler to examine directly the impact on child health of interactions between mother's education and her constraints in caring for her children's health. Estimates of these interaction effects show how maternal education exerts its elusive effect on child health. For example, Caldwell (1979) hypothesized that the education of the mother enables her to exploit local public health care more effectively. His view suggests that the interaction between mother's education and local public health infrastructure as it determines child health is complementary or positive. But Rosenzweig and Schultz (1982b) found the opposite to be true in 1973 in Colombia, where differences in maternal education have a smaller impact on child mortality in urban populations that receive more public and private hospital and clinic services per capita. Their findings are consistent with the aggregate patterns reported elsewhere in Latin America by Behm (1980) and Palloni (1981) and in Sri Lanka by Meegama (1981). If the effectiveness of health care of children associated with the education of mothers is a substitute for local public health expenditures in the production of child health, as these studies imply, additional outlays on public health should have the greatest impact improving child health among the least educated segments of the population. Although more research is needed on the personal distribution of the benefits of many forms of public expenditure programs, these initial investigations suggest

that public health programs distribute their benefits progressively across low income populations, according to levels of adult education.

Other studies examine interactions of health input choices themselves and environmental constraints on child mortality. Where household water and sanitation facilities are poor in Malaysia, breast-feeding is associated with larger reductions in infant mortality (Butz, et al., 1984). Estrey and Habicht (1987) found that safe water supplies reduced child mortality by a greater amount for more educated mothers, whereas access to toilets in the household is less effective in reducing child mortality for more educated mothers. In Costa Rica, Haines and Avery (1982) found the effect of a year of education for the mother is to reduce her child mortality between 6 and 7 percent, holding constant for household sanitation and dwelling quality and local levels of child mortality and health care facilities. Haines and Avery confirm that the child health gains related to mother's education are smaller in urban areas, a result also noted by Schultz (1980a) in Colombia and Behm (1976) in several Latin American capital cities.

But the studies of Malaysia and Costa Rica treat the household's water and sanitation infrastructure as well as the mother's breast-feeding as exogenous or, in other words, as not affected by maternal education or unobserved variables that might themselves influence child health outcomes.

Barrera's (1988b) study of household and community data from the Bicol Province of the Philippines extends these earlier studies. He assumes that water and sanitary facilities of the household are endogenous choice variables and may be thus potentially correlated with unexplained variation in child health. Consequently, he first analyzes the relation between maternal education and child health conditional on community average levels of water and

sanitation, not the household's actual variables that are affected by the family's own choices. Barrera then finds mother's schooling has a larger protective effect on child health in unsanitary communities where there are visible signs of excreta and in communities that are further (in time) from out-patient health care facilities. In a community where piped water is the predominant source of supply, the impact of mother's education is diminished. Where water sealed toilets are more common in the community, there are larger maternal education differences in child health. Barrera's shift from household-level measures of water and toilet facilities to community-level variables representing the local availability of these facilities, reverses the conclusions drawn by Estrey and Habicht (1987). Community water supply appears to substitute for mother's education, but the modern toilet complements it (Barrera, 1988b: Table 16). At the same time, higher income and mother's education are shown by Barrera to increase the chance that a household has acquired piped water and water-sealed toilets.

Another important input to child health, the duration of breast-feeding, is inversely related to mother's education in many countries (e.g. Blau, 1984; Wolfe and Behrman, 1982; Sirilaksana, 1986). Breastfeeding is a beneficial input for child health primarily if it is supplemented by other foods before the end of the baby's first year. In Barrera's rural Philippine population, the mother's education shortens only the duration of unsupplemented breast-feeeding (1988b: Table 23). Moreover, he estimates that the duration of unsupplemented breast-feeding is a "positive" child health input only up to six months of age. The more educated mother is more able to replace mother's milk with sanitary substitutes. For the less educated, Barrera hypothesizes, the supplementation of breastfeeding at less than six months is more harmful.

Thus, the measurement of the optimal duration of breastfeeding and time to introduce supplementary foods in the child's diet depend on the education of the mother who must manage to provide sanitary substitutes for her own supply of milk. In other words, the duration of unsupplemented breastfeeding and education appears to be substitutes in producing child health. This finding may partially account for why more educated mothers breastfeed less (Barrera, 1988b: Table 25).

Nutrition and labor productivity are positively related at the individual or household level. With the recent use of simultaneous equation estimation techniques (Strauss, 1986) it has been shown convincingly in three studies that nutrition raises labor productivity, at least at very low levels of income (Strauss (1986) in Sierra Leone; Deolalikar (1988) in India; and Sahn and Alderman (1988) in Sri Lanka). Since the demand for nutrition is also influenced by prices and incomes, the standard assumption that production decisions and consumption decisions can be sequentially and separately solved by the farm household may need to be studied further (Singh, et al., 1986). To analyze intrahousehold allocation of nutrition, data are needed either on individual food intakes or on measures of nutritional status. Most analysis has been based on the latter anthropometric indicators of nutritional status, such as height for age, or weight for height, thickness of skinfolds, etc. that can be readily measured in a single survey. But these anthropometric indicators of nutrition reflect more than the adequacy of current nutritional inputs. They also incorporate the past pattern of nutrition, as modified by individual differences in metabolism, absorption rates possibly related to infectious and parasitic diseases, and activity levels. Studies such as Barrera (1988), Struass (1987) and Thomas, et al. (1987) analyze such

accumulative indicators of nutrition.

Much less economic analysis has focused on actual individual consumption patterns by gender within the family, because (1) they appear to be accurate only over a short recall period, of say 24 hours, and (2) they should be repeated at least several times over a year to reflect the variation associated with seasonal changes in food availability and activities, and (3) they appear to embody more measurement errors than do anthropometric indicators. In the available studies of individual nutrient intakes in low income countries, small working samples also weaken the evidence. One suggestive study of Central India finds that calorie intakes are not significantly biased in favor of boys compared to girls, except during the lean season, when households have lower overall consumption levels (Behrman, 1988). Further studies of actual nutrient intakes within the family should be encouraged along with the demand for health care and time allocation within the family (e.g. Pitt and Rosenzweig, 1985, 1988).

Determinants of Child Achievements in School

There are surprisingly few studies of the household determinants of school enrollment and attendance rates by gender in low income countries, though this may be changing. In an analysis of district-level data from the Indian Census of 1961, Rosenzweig and Evenson (1977) found that where child wages were higher, children supplied more labor to the market and enrolled less in school. Male wage rates were negatively associated with child schooling levels, while female wages were positively associated with the enrollment rates. These partial effects of wage rates on schooling were implied by their model, but only after a number of cross-commodity substitution patterns were imposed and price (wage) effects were assumed to outweigh income effects.

More generally, individual level data often show father's education is also a stimulus to the child's achievements in school.

King et al. (1986) estimated from several Asian surveys the determinants of parents' investing in the schooling for their children, and how they respond differently toward the schooling of girls and boys. Analysis of schooling decisions from a Peruvian survey permitted the analysis of whether the parents invest by sending their children away to continue their schooling, generally at a private versus local public school. Analysis of the schooling decision suggests that community school access and family income both increase enrollments, particularly for girls (King and Bellew, 1988; Gertler and Gleewe, 1988).

In most studies of schooling of children in high income countries, the mother's schooling has a larger effect than the father's, even though the father's education implies a larger market income effect, because he tends to receive a higher wage and work more hours in the labor force (Leibowitz, 1974; King et al., 1986). The evidence that mothers' schooling exerts a greater effect on the schooling of their daughters than their sons is less well established (e.g. DeTray, 1988): Table 5). It is a hypothesis that needs further study.

Determinants of Fertility

Fertility is generally observed to decrease as women's education increases. Occasionally, however, fertility of unschooled women is lower than that of women with a few years of primary education (Cochrane, 1979). A husband with more schooling (or income) in traditional agricultural societies is frequently observed to have a larger family as noted previously. But spouses of similar education tend to marry. Because of the general positive

association between education of spouses, the evaluation of the partial effect of women's schooling on fertility becomes more negative and more likely to be monotonic when the positive effect of men's education or income on fertility is controlled. Economic models of family decision-making direct attention to the distinctive effects of men's and women's schooling on demands for children and resulting fertility. Simple correlations can be misleading in this area.

Women's education not only decreases desired fertility, it also permits couples to come closer to reaching their reproductive goals. Their increased reproductive control is partially achieved by delaying marriage, but more educated wives also have fewer unwanted conceptions (and births). Though the husband's education also enhances contraceptive effectiveness, the wife's education has a stronger effect on these forms of reproductive behavior, whether inferred from a respondent's own classification of conceptions as unplanned or from econometric analyses of the reproduction function and its residual (Rosenzweig and Schultz, 1985, 1987). This may be yet another sphere of nonmarket production where the education of women generates an important spillover that may be valued by society--avoidance of unwanted births.

All of these routes by which women's education may benefit society--reducing child mortality, improving child nutrition, increasing child schooling, and reducing unwanted fertility--involve benefits that are partly captured by the woman's own children. If parents are entirely "altruistic" toward their offspring, and view their children's utility as their own, these activities would be allocated investments and be produced in an efficient manner within the family. In other words, most of the "externalities" from women's education that accrue from her nonmarket production activities are internalized in the altruistic nuclear family. Nevertheless, there are

numerous instances where society has strengthened the rights of children relative to the economic claims of parents, such as when the conditions of child labor are restricted or school attendance legally mandated. Improvements in a woman's education are linked in many societies to increases in the level of investments in the human capital of her children. A subsidy that favored women's schooling would help to shift private household resources toward investments in the quality of the younger generation. Empirical studies have not yet sought to appraise the responsiveness of family resources to practical interventions of this form.

Policy Implications of the Empirical Evidence

The available evidence indicates that primary and secondary schooling for women can be defended on the grounds of efficiency (high market social returns), equity (increased capabilities of the poor), and intergenerational redistribution that improves the health and education of children. In contrast, direct transfers of consumption to women and children, for example by food programs, are likely to be only marginally effective because these public transfers are readily redirected within the family to conform to its traditional goals. Investments in women's traditional vocational skills may not help much, because they may limit their future employment opportunities. Restricting women's work to traditional sectors may compel them to compete in less profitable and possibly declining sectors of the economy. Anti-discrimination laws are of uncertain value even in high-income countries, while in low-income countries these policies appear to penalize primarily large firms that cannot avoid the resulting bureaucratic red tape. Innovative institution building to advance the rights and welfare of women is appealing in principle, but in practice requires a deeper understanding of social

engineering than is commonly encountered.

It would be useful to develop alternative measures of women's status that can be quantified for comparative purposes across societies. This would be particularly valuable in those cases where there is insufficient data to fit sample selection-corrected wage functions, as in rural Bangladesh (Khandkar, 1988), or as a check on these indirect statistical procedures. The woman's age-at-marriage is often used to approximate the economic influence she commands in the family (e.g. Acharya and Bennett, 1983). The bargaining model of the family could also be used to interpret the difference between her husband's age and her own as a relative measure of their economic powers. But as the earlier discussion of marriage patterns implied, these outcomes are conditioned by the woman's family's resources, her parents' education, their investments in her schooling, the number of her siblings, and so on (King et al., 1986). We need to know how these parental constraints interact with community infrastructure (e.g. schools), and with the local social norms of marriage. This should be high on the research agenda if public policy is to increase the economic capabilities of women and provide them with the opportunity to manage more of what the family spends.

From another perspective, the difference between a wife's education and that of her husband can proxy for the balance of economic capacities. This line of analysis can be further refined by imputing to both a market wage rate that is corrected for sample selection bias or the shadow value of nonmarket time for nonparticipants. But for the same reason that age differences between spouses is best viewed as an endogenous indicator of relative female-male authority and economic influence in the family, the educational difference between spouses is an even clearer reflection of the opportunities

provided by the parental families to girls and boys intermediated by the marriage matching institutions of a specific society. To treat these spousal differences in education or age as an exogenous constraint on the family's subsequent behavior is to truncate the analysis before it is possible to understand how the parent resources and investments in children along with community policy variables work their effect on the balance of economic capabilities acquired by young men and women. The potential leverage of policy on this process is thus suppressed from empirical analysis by including measures of spouse matching, as though they were exogenous variables. In the short run these spousal differences are given, but in the longer run they should adapt to policy interventions.

No studies have assessed, to my knowledge, the impact of legislation that sets a minimum age for marriage for women, prohibits dowries, or specifies women's rights in divorce and inheritance. If most members of society to not see these laws as in their interest, are the laws still treated as symbolic social goals but merely left unenforced? What are the real consequences for women and society of such changes in legal code in low income countries? The topic could benefit from research, but the task will not be easy.

There is a consensus among anthropologists, sociologists, and economists that women generally achieve a higher status in society if they are more productive economically in relation to men (Blumberg, 1984, 1988; Marini, 1987). Targeting consumption resources to women is likely to be an ineffective and transitory means to increase the productivity of women and improve their lifetime welfare. Legislating changes in labor markets, prescribing employment practices, and modifying sectoral priorities to expand and improve women's employment opportunities appear to be blunt and probably ineffective policies

in a low income country. Investing in the human capital of women to perform market and nonmarket work more productively is a more promising way to increase women's economic capabilities. Formal education is the most widely documented way to achieve this goal efficiently. With better education of women, household spending is likely to go increasingly for child health, nutrition, and schooling. Basic schooling appears to be the most efficient and equitable investment option, and one that is often now allocated disproportionately to men. This allocation of human capital requires more study; its justification on "cultural' grounds should be reckoned carefully in terms of economic costs reflected in shorter lifetimes, higher fertility, and lower per capita productivity.

Regional Patterns of Investment in Women and Men

The largest investments in human capital are in schooling and health. Differences in education between women and men can be inferred from two sets of data: school attainment as reported by individuals in a census and enrollment rates as reported by schools to UNESCO. Although both types of data have their shortcomings, and probably overstate the human capital received by women in relation to men, the patterns across countries in both are similar.

Today in the industrially advanced high income countries women receive nearly the same number of years of schooling as do men, and women often report higher enrollment rates than men until secondary school. Latin America and East Asia are quite similar to the developed countries in this regard. At the other extreme are most of the countries of South and West Asia and North and subSaharan Africa where women receive between half and three-fourths the years of schooling as do men. This regional pattern is illustrated in column 1 of Table 5 using estimates of years of completed schooling from a recent census,

Table 5

Years of Schooling Completed and Expected Years of Enrollment Ratios by Sex, for Regions from 1960 and 1980: Selected Available Countries

Region (number of countries observed)	Years of Schooling 1960-1980 Completed Age 20-24 Female to Male Ratio (1)	Male Level in Years (2)		Expected Years of Enrollment Female to Male Ratio (3)	(4)	Male Level in Years (5)	(6)
1. High income industrially advanced countries (including Japan, Israel, and South Africa)	1.00 (24)	8.8 (24)		.84	1.00	10.8	12.6
2. Latin America	.84	5.5		.82	.87	5.6	9.8
3. East Asia (excluding Japan)	.83 (5)	6.4 (8)	Asia (excluding Arab)	.65	.75	7.5	9.4
4. South Asia	.45 (5)	3.8 (5)					
5. West Asia (excluding Israel)	.34 (2)	4.7 (2)	Arab States	.48	.73	3.5	7.0
6. North Africa	.39 (2)	3.5 (2)					
7. SubSaharan Africa (excluding South Africa)	.44 (7)	3.3 (7)	Africa (excluding Arab)	.56	.73	3.5	7.0
World Total	n.a.	n.a.		.75	.82	7.7	9.8

Source: Colums 1 and 2 derived by averaging of the available sample of country estimates reported in Table A-1 by the author. Columns 3-6 derived from UNESCO estimates of enrollment rates by level, with different regional groupings. 1987 Statistical Yearbook, Table 2.10. See footnote 27 for definition of expected years of enrollment.

and in columns 3 and 4 based on official enrollment rates accumulated across school levels (see Table A-1).[27] The estimates of educational attainment are for persons age 20 to 24 in a sample of censuses in about 1970, and approximate the distribution of educational investments made around 1960. The 1960 accumulated enrollment rates are estimated by UNESCO to represent averages for all countries in each region. The figures in column 3 are slightly higher than those in column 1 for Asia and Africa. From 1960 to 1980 enrollment rates increased, slowly converging between women and men. But differences remain large. Are these differences in female and male educational investments explained by the diverse economic conditions in these countries?

An analysis of educational systems from 80 countries for the period between 1960 and 1980 sought to account for differences in public expenditures on education and enrollment rates on the basis of household demand and production theory. More than 90 percent of the intercountry variation in public school expenditures per school aged child and 40 to 70 percent of the variation in primary and secondary school enrollment rates are explained by real income per adult, the relative price of teachers, the school-aged share of the population, and urbanization. The proportionate increase in girl's enrollment rates associated with a proportionate increase in income is significantly larger than the analogous income elasticity for boy's enrollment. Price elasticities are also larger in absolute value (negative) for female enrollment rates than for male. Economic growth and long run expansion of the educational system that contributes to the decline in the relative price of teachers appear to increase women's schooling in comparison to men's. Within countries over time this gap between the educational attainment of women and men has also narrowed, but more slowly than forecasted from this relationship

across countries at different levels of development (Schultz, 1987).

Unless special measures are adopted, female enrollments may decrease by a larger proportion than male enrollments in periods of declining income per adult. Public sector retrenchments since 1975 in Africa and Latin America have cut real expenditures on public education, while private schools are also contracting (Schultz, 1987). Research is needed to determine whether female enrollments are indeed falling relative to male enrollments in those countries that are undergoing more difficult periods of macroeconomic adjustment, or whether the forward momentum in investments in women has offset the current decline in income in Latin America and Africa.

This regression model is then employed to hold constant for national income, prices, and demographic structure, while the remaining unexplained variation in enrollment rates and public school expenditures per child are summarized in Table 6 by region. The pattern in these residuals is somewhat different from that in Table 5. Africa is an over-achiever in schooling, given its low income and high cost of teachers. These conditions in Africa also account for the lower female to male enrollments in that continent. South and West Asia, however, continues to invest less in primary and secondary schools than can be explained, and the shortfall is significantly larger for females than for males. Latin America reports lower than expected enrollment rates, but its shortfall is greater for males than for females. In the high income countries, there is a small positive deviation in enrollment rates for those predicted by the model, and they tend to be slightly larger for women than for men at the secondary school level.

There are no analogous indicators of the gender differential in investments in health or use of health services. There is even little agreement on

Table 6

Percentage Deviations in National Educational Investments, Adjusting for the Effects of Income, Teacher Salaries, and Demographic Composition: 1960-1980[a]

Region	Primary School System: Number of Country/Year Observed	Enrollment Rates: Female	Enrollment Rates: Male	Expenditures per School Aged Child	Secondary School System: Number of Country/Year Observed	Enrollment Rates: Female	Enrollment Rates: Male	Expenditures per School Aged Child
Europe, Oceanic and North America	36	+6	+8	-6	21	+3	+7	-6
Latin America	43	-10	-15	-5	35	-30	-39	-16
East Asia	21	+22	+12	+9	18	+27	+19	+2
South and West Asia	24	-49	-24	-21	16	-49	-7	-4
Africa	62	+26	+16	+15	49	+43	+34	+17

[a]Dependent variables are (1) the logarithm of the number of children enrolled in primary schools divided by the number of children age 6 to 11, and (2) the logarithm of the secondary enrollment divided by the number of children age 12 to 17; and the local public expenditures on the school level divided by the children in the respective benefiting age class expressed in real 1970 local currency and converted to 1970 U.S. dollars on the basis of IMF exchange rates prevailing on average for 1968 to 1971. See source for more detail.

Source: T. P. Schultz (1987: Table 13).

measures of adult morbidity or what constitutes functional good health that could be applied to men and women comparatively across societies. Mortality by age is therefore used as the preferred measure of health for men and women. It is typically summarized as life expectancy at birth, but infancy is the most vulnerable period, and infant mortality by sex is particularly sensitive to differential care in the family, as noted earlier.

Life expectancy appears to be greater for women compared to men in populations where schooling is more equally distributed by gender, as shown by WHO estimates by region shown in Table 7. Biological evidence suggests that women are genetically more viable than men. Given similar consumption and self-investment opportunities, women have lower death rates than men at all ages, except perhaps during the years women bear children if they have not had any education. Death due to bearing a child is twenty times higher in South and West Asia and North and subSaharan Africa than in developed countries, and women in these regions also bear two to three times as many children as do their counterparts in high income countries (column 7, Table 7). Nonetheless, infant and childhood mortality is quantitatively a larger factor in the low life expectancy of females in these low income regions. Differences in child mortality by sex are rarely known with great precision in poor populations, and the official figures as averaged in columns 5 and 6 of Table 7 are not necessarily reliable. Greater confidence can probably be placed in the infant and childhood mortality estimates derived retrospectively from the recent round of World Fertility Surveys (Rutstein, 1983; Hobcraft et al., 1985). Only two out of 29 surveys, those for Jordan and Syria, revealed greater female than male infant mortality, while three reported higher female than male child mortality between the ages of 2 and 5 years--Bangladesh,

Table 7

Life Expectancy at Birth and Infant Mortality, Ratio by Sex and Maternal Mortality, for Regions in 1960 and 1980

	Life Expectancy at Birth				Infant Mortality		Maternal Mortality
	Female to Male 1960-65 (1)	Female to Male 1980-85 (2)	Male Level 1960 (3)	Male Level 1980 (4)	Female to Male ca 1980 (5)	Male Level ca 1980 (6)	per 100,000 Live Births ca 1983 (7)
High Income	1.08	1.11	66.6	68.8	.80 [a]	17.4	30
Europe	1.05	1.09	67.0	69.7	(22)	(22)	30
Oceania	1.07	1.06	61.7	64.8			
North America	1.10	1.12	66.9	69.4			
Japan	1.08	1.07	66.5	73.8			
Israel	1.04	1.05	68.1	71.0			
South Africa	1.07	1.05	52.1	60.9			
Latin America	1.06	1.07	54.9	62.1	.83 (11)	44.09 (11)	270
East Asia (excluding Japan)	1.06	1.05	51.0	64.5	.79	34.2	187
South East Asia	1.06	1.06	43.2	53.5			
Other East Asia (e.g. Hong Kong, Korea)	1.07	1.06	54.2	63.4			
China	1.06	1.04	53.4	68.5			
South Asia (middle)	.97	.98	43.3	50.7	.82 (4)	51.0 (4)	618
West Asia	1.05	1.06	43.2	58.2			
Africa	1.07	1.06	40.6	49.3	--	---	
North Africa	1.05	1.05	45.5	54.7	.98	58.1	500
SubSaharan Africa (exculding S.Africa)	1.08	1.07	38.1	47.7	.81 (4)	86.4 (4)	676
World	1.05	1.04	50.9	57.9	--	--	---

[a]Number of countries averaged in parentheses: Not necessarily representative of region because of data limitations.

Sources: First four columns weighted by populations. Estimates from United Nations, Demographic Indicators of Countries, New York, 1982; Columns 5 and 6 are unweighted averages of countries reporting in 1983 UN Demographic Yearbook, Table 16; Column 7 are estimates weighted by population of regions from Ross et al., 1988, Table 34. For country level estimates that are probably more reliable for Africa and Asia, see Appendix Table B.

Pakistan, and Egypt. All of these countries fall in the South and West Asian and North African regions.

Analyses of mortality trends by sex confirm, as with education, that in most regions of the world the prospects for survival are improving more rapidly by women than for men (United Nations, 1982). Most countries are converging toward the sex differences in mortality schedules that are observed in the industrially advanced countries, but the pace of progress differs markedly by region. Women's education is the best predictor of the level and sex differences in mortality schedules; female enrollment rates are used in 50-year forecasts of national mortality schedules (Zachariah and Vu, 1988: xv). Until life expectancy at birth for women exceeds 60 years, the rate of increase in longevity is greater in countries where more than 70 percent of girls are enrolled in primary school (as 1956-59). Thus, studies of national mortality patterns confirm the critical role of women's education in the rate of health improvement of national populations, extending the evidence beyond the survival of a woman's own children that is documented from household studies (Cochrane et al., 1980; Mensch et al., 1986).

In conclusion, women are especially poor in relation to men in their acquired capabilities, such as schooling, in the world's poorest countries, and in these same countries women's low health status is reflected in their shorter lives in comparison to men's. This deficit is particularly pronounced in South and West Asia and North and subSaharan Africa. Increasing the productive capabilities of women in these poor countries through investment in their schooling appears to be an efficient use of social and private individual investment resources. Beyond schooling, other public policies have been proposed to help women realize more efficiently their productive potential and

contribute more to the growth of their societies. Though these policies have not been empirically evaluated as extensively as investment in education, some appear promising.

5. Factor Markets, Information Diffusion, and Equipping Interventions

There is much evidence that the long-run individual and social benefits from increased human capital investments in women are attractive compared to alternative uses of public resources. But are there other avenues for development programs that could also enhance women's productivity, given their current stocks of human capital. There are indications that women could be more productive in the short run, if they had greater access to new technical knowledge, had more instruction on how to use effectively new and existing productive inputs, had means to acquire credit to respond to economic opportunities, and had greater control over their own assets and livelihood.

The public sector subsidizes and/or manages many activities and services because the private market fails to produce them in sufficient amounts. The most commonly cited reason for the underproduction of these services is because market structure does not provide private firms with the means to charge the consumer or producer for what they produce. Alternatively, there may be internal economies of scale that encourage natural monopolies with their exploitative pricing. Arguments of basic needs, social externalities and equity are also made to justify these interventions of the public sector. Individuals may benefit as consumers or producers because the public sector reduces time and monetary prices of such goods and services.

The provision of public services frequently complements the capabilities of some people more than others, adding to their economic productivity. Some

public services are associated more with female than male productivity, and vice versa. But administrative records, and hence quantitative analysis, rarely consider the gender of the recipient of a public service or for that matter the gender of the administrative staff who provides the service to the public. It has been observed that public services that favor female productivity are given relatively low priority in most low income countries. This may be traced to our undervaluation of home production. For example, priority is often given to supporting cash crops, which are often managed by males, because of the commercial and governmental interests in these potential export crops that provide tax revenue. Regardless of why private markets fail to meet social needs, the economic issues of effectiveness and distribution of benefits tend to be hard to evaluate empirically. They involve measuring the substitutability between male and female labor in many production processes, the interaction of modern productive inputs and extension with male and female labor, and the functioning of interconnected factor markets as they impinge on the marginal product of both types of labor.

Home Production and New Technologies

Women stand to gain from the development and spread of new technologies that improve their efficiency in home production. There is relatively little systematic investment by the public sector in low-income countries designed to improve labor productivity in the home, yet this is a large share of total production in these countries. Only a few international assistance agencies have encouraged research and development projects that seek small scale technologies that would enhance production possibilities in the home. Systematic evaluation of these undertakings is rarely attempted.

Women in the lowest income countries spend much time fetching water and

fuel, preparing family food, and caring for children. Innovations developed to relieve these female tasks can also allow women to transfer some of their production from the home to the market, as in the case of rice milling in Indonesia (Timmer, 1973) or the production of beer in Africa (Haggblade, 1987). Reductions in consumer prices should distribute widely the benefits from such new technology in the long run. If this process is monitored more frequently, policymakers will be alerted to the home and price environment in which technical change will permit women to capture more of the resulting economic opportunities. Technical change will undoubtedly continue to transfer production from the family to market-oriented firms. Instigation and guidance of this complex process will require empirical evaluation studies that distinguish between the repercussions for men, women, and children.

Agricultural Extension and Research

Studies of the effectiveness of agricultural extension programs do not provide a strong foundation for policy although $5 billion a year is now spent on it, according to recent world estimates (Birkhaeuser et al., 1988). Most studies are from India and the United States, and do not necessarily agree on why some programs are more effective than others. To determine the environment in which extension is either more or less cost effective requires more comparable studies in a broader range of countries, with different management structures, staff training, technological infrastructure, price policies and, most of all, the extent of the knowledge to be taught that is profitable for farmers to use.

A number of studies suggest that extension, by increasing farmer productivity, narrows the difference between more and less educated farmers. This parallels family planning, where contraceptive adoption and fertility

differentials between more and less educated women are narrowed by extension work (Schultz, 1988b). Agricultural and family planning extension appears to be a substitute for formal education. Extension particularly benefits the recipient who is less well trained to decipher and evaluate new technologies, adopt novel techniques, and obtain combinations of inputs that are likely to be more profitable or cost-effective. It has been argued for nearly two decades (Boserup, 1970) that some agricultural extension agents should be women, and that contacts with female as well as male farmers should be monitored in areas of the world where farms are often managed be women. Extension programs in the United States have generally included female agents to work with women in nutrition and home health measures, as well as farm management. Still there are no strong evaluation studies that distinguish how the gender of extension staff or of the person contacted at the farm level affects the productivity of farm labor. Farm-management and household-production studies have shown the levels of productivity of female farm managers and how it increases with education (Moock, 1976, 1981). But these approaches have not been used to evaluate extension or credit policies or to provide a basis for replication studies (Spring et al., 1983; Ngwira, 1987; Herz, 1988; Birkhaeuser, 1988).

Agricultural extension systems are often criticized as not serving women, particularly in subSaharan Africa, where women predominate in the farm workforce (Boserup, 1965; Lele, 1975, Berger et al., 1984; IRRI, 1985; Ngwira, 1987; Herz, 1988).[28] Women tend to concentrate on food staples eaten by the family and men on cash crops in Africa and in other parts of the developing world. But agricultural research to improve yields initially focused on export crops and consequently raised the productivity of men more rapidly than

that of women. In the last decade, some of this bias has been corrected; more research has been allocated to staple foods consumed by the poor, such as cassava, pulses, and sorghum (Judd et al., 1986). Nonetheless, there is evidence that the direction agricultural technology has evolved in Africa has placed women at a growing disadvantage relative to men. The recent relative decline in prices of some export crops in Africa compared to staple crops, may enhance women's productivity. But growing agricultural productivity is likely to continue the trend of slowly declining prices of rice, wheat, maize, and traded staples. If women's productivity in local foods does not keep pace, or they fail to diversify (e.g., into aquaculture or vegetables), their real income will continue to be eroded (Kennedy and Cogill, 1986).

There is debate today on how to stimulate African food production (Gladwin and McMillan, 1989). Some would encourage larger scale production units that can introduce more sophisticated technologies with greater capital intensity. Others would increase the productivity of existing small-scale farms, though the effect on marketed surplus might be smaller. The former direction would lead rapidly to fewer female farmers, if the larger scale units proved to be cost-effective. The latter course would entail programs to increase the productivity of peasant farms, most of which are currently managed in Africa by women. But perhaps in the longer sweep of history increasing intensification of African agriculture will nonetheless displace women, as expected by Boserup (1965, 1970). But this form of displacement would occur more gradually and at very different rates throughout subSaharan Africa, since some areas have not yet expanded to the limits of cultivation. Among the benefits and costs of these alternative forms of subSaharan agricultural development are the likely changes that they would imply for family

consumption and human capital investment patterns. The studies reviewed in Sections 3 and 4 suggest that changing the balance of productivity between women and men could have long-run consequences for the level of child mortality, nutrition, schooling and fertility in the continent, as well as rates of economic growth. The current policy debate should weigh these connections by evaluating carefully the consequences of existing programs that have been successful in promoting agricultural development in either direction.

Land Ownership, Credit, and Labor Markets

Along with extension services, farmers also need credit to pay for new seeds (HYV), irrigation wells, fertilizers, pesticides, etc. Although there are few experimentally designed studies, casual evidence suggests strongly that women are at a serious disadvantage in getting credit. Land ownership is the usual collateral for farm credit, but women seldom own land. Even where religious law refers to the equality of men and women, actual practices of inheritance and the control of property in marriage, strongly suggests that women do not have equal access to loan collateral and thus are denied credit (Davision, 1988; Moock, 1986; Hossain and Afsar, 1988). Women working on communal land have no marketable property rights to mortgage. If this form of market failure leads to an inefficient allocation of credit, institutional innovations may be needed--perhaps by replacing loans based on collateral by loans based on closely knit groups which are identified with their community. The community's future credit thereby depends on the repayment of current individual loans.

The most extensive and best documented program providing credit to the poor is that of the Grameen Bank of Bangladesh. As of August 1988, its 453 branches operated in about 9,000 villages, about ten percent of all villages

in Bangladesh. It had lent to some 413,000 "members" and 84 percent of these were women, and they received 70 percent of the loans. Groups of members borrow with no collateral and complete their repayment within one year or lose the group's rights to borrow in the future. Membership is restricted to only persons with less than .5 acres of cultivatable land or assets not exceeding the value of one acre of medium quality land. Repayment rates have been favorable compared to other commercial banks, but the cost for loan placement and monitoring of assets is not easily derived from reports. Evaluation studies of the Bank are favorable but not sufficiently analytical. They do suggest, however, that here is an institutional innovation that mitigates the disadvantages of poor women in expanding their means of production. Comparisons of the consequences of the Bank being in a village on average productivity and earnings of village women and men would strengthen future evaluation studies. Is economic progress more rapid in "bank villages" than control villages without access to Grameen Bank resources? (Hossain and Afsar, 1988; Hossain, 1987).

To promote the more efficient allocation of talent across the entire economy, women should be helped to compete in male-dominated professions and industries as men should be encouraged to enter female dominated segments of the economy. Women may work in declining sectors, where modern emerging technologies are likely to depress their incomes by the generation of new man-made substitutes. These women need opportunities to enter more favorably situated sectors. If they do not have as much education as men, women will need more specific training and assistance to redeploy their skills. Nonetheless, general education remains the most reliable means to improve the mobility of women in the long run. Women have fared poorly relative to men in

those regions--South and West Asia and Africa--where they have had the least education compared to men. The jobs they can compete for are limited by their schooling and vocational skills, and the hallmark of modern economic growth is relatively rapid changes in the structure of employment that rewards mobility (Kuznets, 1957, 1966).

Educated women are scarce relative to educated men in some countries, and they are in equal numbers to men in other countries. It might be expected that where educated women were relatively scarce their wage advantage over less educated women would be greater than that for men. But private returns to schooling are roughly comparable for men and women across a wide range of countries. Perhaps the apparent rigidity of sex segregation by occupation and industries does not preclude the substitution of male for female labor of comparable education across a sufficient range of activities to equalize relative returns at each level of schooling for men and women.

There is little evidence that families in all regions of the world are guided in their investments in female and male children by the private rates of return to schooling received by the child. The puzzle is why families are not efficiently allocating their investments among their offspring? Parental claims on the adult productivity of boys may be more secure, given some family-cultural systems, than their future claims on girls. If the parent's criterion for allocating school investments between boys and girls does not lead to a socially optimal intergenerational pattern of investment in human capital in some countries, what should be the role of public policy? The inefficient allocation of resources, even if we do not know precisely the cause, can frequently be corrected by a judicious application of taxes and subsidies.

In the classic textbook example of the apple grower and bee keeper, the external social economies linking these two activities lead to an underproduction of both because of the market failure. A subsidy to both independent producers could maximize social product, or both activities could be undertaken by the same producer to internalize the economy. In the case of the parents, unless they are appropriately rewarded by the groom for their educated daughter, the parents may underinvest in their daughter. Research should focus on why families invest different amounts in their girls and boys. It was noted above that this disparity in investment in men and women has a tendency to be smaller in high income industrially advanced countries and to diminish over time as countries develop (Schultz, 1987). Public policy can probably speed up this process with incentives that would motivate the family to invest more in females. But the costs of and responses to such interventions are unknown. The family's schooling behavior by gender must be studied to identify promising policies that could be justified given the scarcity of administrative talent and severely strained social-welfare budgets. Analysis would then be needed of pilot programs to evaluate precisely the capacity of such policies to produce the desired changes in intrafamily investments and to assess whether the policies induced any undesirable side-effects.

Family Planning and Maternal Health

Family planning programs subsidize contraceptive supplies and employ field workers to explain birth control techniques to potential users and inform them how these methods may be obtained. Some programs do offer male contraceptives, such as the condom or vasectomy. But the technological breakthroughs of the 1960's-1970's that were disseminated by the first wave of family planning programs were female methods, such as the IUD and oral steroid (pill). These and female sterilization are still the most widely used contraceptives. Experience in East Asia suggested that female field workers were more successful in recruiting contraceptive users (e.g. Rogers and Solomon, 1975; Repetto, 1977). Older married women or midwives with an educational level on a par with their community appeared to be most effective. Similar evidence has been collected in Mexico and elsewhere (Azcona et al., 1980). It would be desirable to analyze actual fertility declines induced by the different types of field workers and not simply the acceptor rate (Schultz, 1988c). But it is reasonable to assume that where the methods offered by the program are for women, female field workers should have an advantage.

The same reasoning has not been transferred, to my knowledge, to the delivery of prenatal, maternal, and child health care. These kinds of health care are also received by women who, if adequately instructed, would use it at home. Women doctors and paramedic staff might prove better than men in delivering many forms of health care oriented toward women and infants. I could not find reports on the design of pilot or experimental programs to test such a plausible hypothesis. Just as in the case of agricultural extension programs, the predominance of male health program administrators may have contributed to the allocation of a large proportion of government jobs to

males, even though women might do some of them better and probably at less cost.[29] Entirely new public policies may be appropriate to deal with the health problems of women and children. Nutritional supplementation in conjunction with child and maternal health is one such option (Winikoff, 1988). The large gap from region to region in maternal mortality rates illustrated in Table 7 shows that this serious health problem is not being resolved by traditional public policies (Herz and Measham, 1987). Some have even concluded that in subSaharan Africa, public health is unlikely to make any progress until the level of women's education improves (Anonymous editorial, Lancet, 1987).

6. Conclusions

Reliance on traditional market-oriented national income accounts has introduced a systematic bias in development economics that has assigned too low a value to the economic contribution of women in the development process. In reorganizing our approach to economic development, and refocusing our analysis of women and development, it is essential that a family economic framework incorporate both nonmarket and market activities of the members of the household. In what way would such a reappraisal of women's contribution to society clarify neglected opportunities for public policies?

Women are usually enmeshed in a family that trades off the competing interests of its members and coordinates the uses of its members' time and resources in market and nonmarket production. To affect women's status one must generally work through the family. Society can transfer resources to families to raise current consumption levels, but the family can reallocate its resources in a compensatory manner. Thus, this intervention will not

necessarily raise the efficiency of the family as a production unit or even influence how it allocates its resources among members. The effect of public transfers on intrahousehold consumption patterns is thus likely to be greatly reduced.

More promising are social interventions that work to change the constraints impinging on the family and thereby to motivate it to achieve its goals by investing more human capital resources in its female members. The private and social rates of return to women's education at the primary and secondary level are at least equal to those of men. Thus, a more equal distribution of education between men and women would not slow economic growth. In fact, because female education has greater effects on health, nutrition and fertility, it might actually accelerate development. This possibility warrants more study, particularly in South and West Asia and Africa where female education levels are especially low.

There is evidence to suggest that the economic bias of accounting only for market income has led to a misallocation of public development resources in favor of market vis-a-vis nonmarket activities, and consequently men's rather than women's work. A reevaluation of women's nonmarket work has begun to show the pervasiveness of this bias. But this has not yet affected development planning. The rhetoric on "women and development" has been substantial in the last decade, but progress toward establishing an analytical framework free of the traditional market bias has been slow. This framework must be used to guide the collection of data from households and communities that will show where investments enhance women's productivity, broadly defined to include nonmarket or home production.

The traditional economic approach to modeling family decision-making as

the outcome of a unified demand system needs to be relaxed to accommodate bargaining over conflicting individual interests. This will not entail weakening the emphasis it has assigned to the separate prices of women's, men's, and children's time as critical factors explaining the family's allocation of time, determination of fertility, and demand for market goods. But the bargaining model also emphasizes the ownership and control of nonearned income and the context in which individual members of the family work and are compensated for their labor. New data are needed to test and to exploit the distinctive features of this cooperative Nash-bargained framework, such as who owns and controls nonearned income in the household.

Labor supply studies will be needed to categorize "job types" in which women's "control" of their output varies, such as wage jobs, own account work at home or outside of the home, and unpaid family work. This classification process may be aided by parallel studies of family human capital investment in children and other intrahousehold resource allocations for which society has a vested interest. Research could then assess whether the intrafamily distribution of resources varies depending on whether women are engaged in different "job types."

A clearer distinction is needed as to what is the appropriate model for studying family behavior in various regions of the world. What are the empirical consequences of female control of resources for home production and consumption decisions? Evaluation of public policies affecting households will then be more sharply focused and precise. This should lead to sound policies that increase the output of market and nonmarket goods while raising the productive capabilities of women.

Anthropological studies of gender differences in family production and

consumption should be integrated with economic studies of household production, labor supply, and expenditure patterns. The family bargaining framework for evaluating public policies in low income countries should lead to new policy insights. Since not much work has yet been undertaken, one can only identify where the payoffs are likely to be large and the direction in which they may move development policy. In this tentative form, directions are offered for research and policy.

First, statistical methods have been outlined and the family bargaining framework has been mentioned as a useful basis for estimating private and social rates of return to schooling for women and men. Labor force participation and choice of wage employment both influence the selection of samples on which market wage functions are estimated. Procedures should correct for these sources of sample selection bias. Few studies have used comparable identification restrictions. What evidence is available suggests that primary and secondary schooling is a high return activity, and no less so for women than for men. It would seem inefficient to maintain much lower schooling investments in females than in males, as evident now in South and West Asia and in North and subSaharan Africa. Development agencies have a clear mandate to emphasize this investment gap and encourage countries to raise female schooling rates toward those of males.

How this is to be accomplished at least cost has not yet been addressed by practical policy makers nor studied extensively by researchers. How do the constraints of institutions, household resource endowments, prices and wages determine school enrollment rates for boys and girls in various cultural regions of the world? The family controls this decision and must be motivated to adopt the view that girls are as good an investment of parent resources as

are boys. This is apparently not now the case, and consequently social interests would appear to diverge from parental private interests Persuasion and propaganda are probably not the answer. Regulations such as quotas that require schools to increase the fraction of girls enrolled, are also readily circumvented, if the regulations are not viewed as in the parents' own interests.

Variable user fees for boys and girls is one possibility that deserves study as more public sector activities are financed through user fees. Lower school fees for girls than for boys might be effective. One planning minister of Nigeria proposed to do just this. Until maternal mortality rates of Asia and Africa are brought down to the current levels in Latin America (Table 7), an argument could also be made to waive fees for prenatal and maternal health care at least for poorer rural populations.

Second, budgetary allocations of the International Agricultural Research Centers should be reviewed according to where each project can be linked to a particular crop and region (e.g. IRRI, 1985). These expenditures on a crop and region should then be categorized as benefiting primarily either female or male agricultural productivity, or both. If expenditures are imbalanced according to this accounting exercise, the international centers could plan to change their priorities gradually or explore policies that would erode sex segregation of labor for specific high payoff crops.

Third, governments should publish data on the gender of staff and of recipients of their extension and service programs. If these data were available by region, program evaluation of the consequences of these variations could be undertaken. These data should cover agricultural extension programs, family planning extension and services, public health extension and

services, academic and vocational education, home economics and community health programs, informal and adult education, agricultural credit and small business loans, etc. Analysis of these data may perhaps show that employment of more women doctors in the public health clinics or more midwives in the family planning outreach program would be more effective than existing programs. Data are rarely collected now in a form that enable hypotheses such as these to be tested. The cost of collecting such data, geared to explore plausible trade-offs in the mix of staffing and recipients, should be quickly recovered from improvements in the implementation of the programs. Although it would require more administrative effort, a parallel goal should be to collect the data on public sector salary and fringe benefit costs for all male and female staff by professional level, not only to promote wage parity for those performing comparable jobs, but also to permit evaluation studies to estimate the cost-effectiveness of alternative staffing and management structures.

Fourth, employment legislation and effective protection of some industries can generate large benefits (rents) for some workers and impose costs on others. Data on the distribution of these benefits and costs within families might show which public policies place a disproportionate burden on nonmarket production, and which policies benefit better educated workers, or those who work in cities or capital-intensive sectors. Men and women are not necessarily helped equally by such policies. Evidence suggests, for example, that fewer women participate in the modern labor force in low income countries when minimum wages are relatively high (Schultz, 1988a). Minimum wages discourage employment of persons whose productivity is below the minimum wage. A larger proportion of female workers than male workers fall in this category.

Finally, uncertainty and risk have led individuals to insure themselves against future variations in their income by risk pooling across the extended family (Rosenzweig, 1988; Rosenzweig and Stark, 1988). The public sector may try to provide alternative institutions to assist individuals when the family's mechanisms for coping with risk generate negative social externalities. What are the consequences for women's economic status if parent-arranged marriages for daughters are designed primarily to mitigate the family's risks from local crop failure? Crop insurance programs might provide an alternative worth exploring, where the variation of weather can be easily monitored to simplify administration.

Social insurance is also relied on to meet the costs of illness and old age. These forms of insurance influence how the extended family behaves. Women and young girls tend to withdraw their time from the labor force when there is a family need to care for the sick or elderly (e.g. Pitt and Rosenzweig, 1988). Consequently, these forms of social insurance undoubtedly affect women's market participation and productivity, and may thus influence the willingness of parents to invest in the market skills of their daughters. Can poor countries afford to provide parents with a public sector old-age support scheme that substitutes for having many surviving sons? Little empirical research is focussed on the family as an institution for mitigating risk in order to discover how family decision-making adapts to government social policies.

Without much firm evidence of how public policies affect women's productivity or family consumption patterns, it would be useful to design and implement a series of pilot programs based on current knowledge of more promising interventions. Accurately measured indicators of program objectives

must be selected and the program and control groups should be large enough and diverse enough to confidently assess whether the program was effective. Because there are many constraints on the family's decisionmaking that will also influence women's productivity, and these constraints may differ in unmeasured ways across communities, a dispersed sample of communities for the pilot programs and for the control communities is desirable. A theoretical model of family behavior should prescribe the primary factors systematically influencing the indicators of program success. These control factors would be monitored in the base-line and follow-up surveys of the pilot and control community households. Evidence on the program's impact will be more convincing if a random design of the community sample is adopted.

Pilot programs might first be designed around the objective of increasing school enrollment and graduation rates for girls. A second series of monitored pilot programs could assess the effect of equalizing access to agricultural extension services by male and female farmers in Africa, South-East Asia and Latin America. Measures of "farmer contacts" as an indicator of extension output has serious problems (Birkhaeuser et al., 1988), and therefore measures of productivity of men and women across distinct program regions should be analyzed. A third set of pilot programs might explore alternative configurations of child and maternal health programs, where the mix of staff by level and gender would vary. Finally, program innovations in the delivery of credit, such as the Grameen Bank in Bangladesh, should be evaluated. Not only in terms of the gender of the loan recipient, but also the program's consequences for community-wide productivity of women and men. Data should also be sought on investments of families in the education and health of males and females in the program and control communities. An intergenerational consequence of

raising the productivity of women should be to encourage parents to invest more in their daughters. All of the above pilot programs should therefore monitor the choices made by families in producing healthy and educated daughters and sons.

Footnotes

1/This unobserved variable enters into the statistical error in these outcome equations, as would idiosyncratic but individually persistent tastes.

2/Statistical specification tests of endogeneity are only feasible when there is agreement on model identification, which in the analysis of household behavior frequently rests on controversial distinctions that need more explicit discussion.

3/Any mechanism that converts "compensating variation" in family composition and specific consumption patterns into measures of the "cost of a child" or adult equivalence scales are ambiguous. Intercorrelations among endogenous variables are tricky to interpret. The emphasis here on disaggregation of family nonearned income by who controls it adds another complication to this time honored, but unsatisfactory, practice of conditioning demands on family composition (see Deaton, 1986; Gronau, 1988).

4/Of course, the bargaining could occur at the outset, when the family is formed, which suggests that members use their initial resource endowments to agree on the weights for individual goals in the "family's utility function." If these resources change unexpectedly, because of a bequest or inheritance or alternative marriage proposition, the "threat points" would shift and a new bargain and agreed-upon family utility function would be adopted as a guide to subsequent intrafamily allocations.

5/ In principle, the measurement of nonearned income is to capture an exogenous difference across persons in their budget constraint that does not also induce a change in money or time prices of various types of consumption or behavior. In practice, nonearned income (rents, dividends, interest, and capital gains) could arise from inheritances that are similar to schooling, in that they are largely financed by parents and family and can be viewed as exogenous at the start of adult life. But nonearned income also represents returns on a person's life cycle accumulation of savings, and hence captures in part the person's behavior. It then becomes, for some purposes, an endogenous choice variable. Hence, it is desirable for survey questionnaires to pursue the source of current nonearned income, current assets, and the date of receipt of bequests that led to these current assets, and whether they came from the husband's or wife's side of the family. The Rand Malaysian family life survey comes closest to asking these questions, but I know of no analysis of these data from the perspective outlined in this paper (Butz and DaVanzo, 1978).

6/ Evidence compiled by Svedberg (1988) indicates that female nutritional status and survival prospects in subSaharan Africa are superior overall to male, possibly because women are economically more productive in converting calories into work than men. As a consequence, perhaps, parents are paid brideprices for their daughters and have a stronger incentive to invest in their health. The one region of subSaharan Africa where Svedberg's anthropometric indicators of nutrition and mortality do not indicate as strong a bias in favor of females is in Nigeria and perhaps Senegal. Both of these countries contain a significant Islamic element and women's productive roles are more circumscribed in these segments of the population (Caldwell and

Caldwell, 1987).

7/In principle there might be a superior Pareto efficient allocation of husband and wife labor that would yield a larger output for both members of the family. But in practice, there are costs in monitoring labor inputs over scattered plots and transaction costs in exchange of inputs and outputs that might be required to provide both persons with the incentives needed to achieve Pareto efficiency. These transaction costs might absorb most of the output gains.

8/The overall determinant-condition of maximization theory in the family demand model is also rejected by Heckman in the static case (1971: Chapter 2, pp. 32-33). Both the static and "life cycle" estimation approaches pursued by Heckman lead to rejection of the symmetry condition. Ultimately, however, he imposed the restriction to obtain his preferred estimates (Chapter 2, p. 37-38). One possible explanation for the rejection of the demand system parameter restrictions is the difference in spouse-specific nonearned income effects that may be used to infer individual compensated cross-wage effects.

9/Aggregate data were analyzed, for example, in Chile (DaVanzo, 1972), relative education in Thailand (Maurer et al., 1973), the U.S. (Frieden, 1974; Becker et al., 1977), and in Puerto Rico (Nerlove and Schultz, 1970).

10/For example, Rosenhouse (1988) illustrates from the 1985 LSMS from Peru that 90 percent of the male headed households are currently married, while

only 5 percent of the female headed households are in such unions. Her data also show that in Peru half of the female household heads are widowed, and they are older than the male heads. These groups are really quite incomparable and not particularly well structured to analyze particular sources of poverty in society. As discussed in the text, there are many possible causes for the increase in female headed households. The greater longevity of women than men is one possible source. Another source would be the lower frequency of remarriage by women than men. Female household heads also work fewer hours than do male heads, even ignoring the contribution of wives to their households, and the higher average wages received by men than women. Multiple earner households are also the rule, not the exception, in Peru, and the sources of behavioral and biological selection of individuals into households of very different compositions. It is simply difficult to infer anything from the widely reported characteristics of households with male and female heads.

11/ It is easy to fault definitions of "head of household," when there is no consensus on the concept being measured or its use. There is a need to distinguish one individual around which to relate other household members, for the purposes of establishing kinship. There is also the idea of dominant economic provider or family elder whose authority is respected. But in the LSMS in Cote d'Ivoire the customary approach is to count females in the rural sector as belonging to a male headed household even though the "head" resided in a distant city, more or less permanently. The increasing documentation of short-term seasonal or circulating migration in many low income countries underscores the need to measure household membership according to a variety of rules depending on how the data are to be used. For a list of some of the

problems with the current data collection practices see Rosenhouse (1988).

12/Obvious changes involve the decline in child and adult mortality, the increase in age at first marriage, the decrease in marital fertility, and the redistribution of population toward urban areas. All of these changes might plausibly lead women to take on more economic activities outside the family/household.

13/This is empirically illustrated by Schultz (1980b), though the noted differences between the responsiveness of participation and hours can also be explained by other hypotheses, such as fixed costs of entering the labor force (Cogan, 1980b).

14/Cross-equation restrictions are also implied by the family model of labor supply, because the income-compensated cross-wage effect of the husband's wage on the wife's labor supply should be the same as the income-compensated cross-wage effect of the wife's wage on the husband's labor supply. Heckman (1981) reported a test of this parameter restriction and rejected it in the case of a sample of married U.S. couples, both of whom were working and reported a wage rate. This is one way to test the restrictive nature of the neoclassical family labor supply model, though it is rarely attempted. Other estimates for U.S. married couples by age and race groups also confirm that the symmetry of the compensated cross-wage effects does not appear consistent with the unrestricted reduced form estimates (Schultz, 1981; Table 7.4).

15/Layard and Mincer (1985) compares estimates of female labor supply parameters from various industrially advanced countries. A comparative study of seven Latin American countries (ECIEL, 1982) in the 1970s replicated the family labor supply model specification proposed by Schultz (1980b) and reported large positive own-wage labor supply elasticities for married women and smaller negative husband cross-wage elasticities. The estimates of labor supply behavior for women living without husbands were less elastic, as one would expect because they tend to already be more fully in the labor market and more self-sufficient. Men without wives, particularly at young and old ages, exhibit more positive labor supply responses to their own market wage rate, as do single women. Cogan (1980a) shows evidence that the lack of adjustment for sample selection appears to change very little the parameter estimates of the labor supply model for U.S. married women, the demographic group for which the bias might be thought a priori to be most serious. Returns to education for this group is changed from 8.5 to 8.8 percent, when corrected for sample selection bias (Cogan, 1980a: Table 2.1).

16/For example, do subsidized birth control information, services and supplies reduce the lifetime fertility of couples and also increase the "quality" of their offspring? Are more accessible and higher quality (i.e., lower priced) public schools an effective means of increasing school enrollments (quality) and also reducing fertility? The answer to both related questions appears to be a qualified "yes" in the few studies we have to date (Rosenzweig and Wolpin, 1982). Both types of policies are also likely to be associated with women taking on more market production activities and gradually increasing the market wage opportunities of women relative to men (Rosenzweig and Schultz,

1985; Rosenzweig, 1988).

17/Heckman and Polachek (1974) confirmed that the logarithmic wage equation fit US male earnings data somewhat better than did the linear age equation. They also show statistically that Mincer's (1974) specification of the quadratic in post-schooling years of potential experience explains more of the variance in log-wages or log-earnings than does a quadratic in age. Rarely has a theoretically based empirical regularity such as this specification of the wage function been replicated so widely, in so many parts of the world, and had such an effect on economic thinking about a diverse range of social issues.

18/For example, if more able students self-select themselves into the more educated comparison group, the returns to education could be overstated until a selection-corrected measure of the private returns to schooling is computed (Willis and Rosen, 1979). But this form of selection might not necessarily bias the comparison of the directly measured returns of men relative to women, if ability operates in an analogous way to influence who goes to school among both girls and boys. The next section examines evidence on this issue.

19/From the perspective of the early 1960s, this empirical strategy may have reflected a desire to not overstate the returns to schooling, because the concept was novel and controversial. But as indicted below, the resulting differences in empirical methods practiced in the literature has led to reports of women's school returns being deflated for nonparticipation in some cases by half or more, and in other reports the estimates are drawn directly

from wage functions without deflation or sample selection correction.

20/ The analysis of educational returns is complicated if education influences the supply of labor (Schultz, 1968). When a worker's human capital is increased, it is expected to exert an income effect reducing market labor supply and a substitution effect increasing market labor supply. If the costs of acquiring the human capital are fully borne by the individual or family and they exactly offset the market discounted gain in earnings, then the income effect of the human capital is zero. This is the implicit assumption in the equilibrium investment model of Becker (1964) and Mincer (1974) and elaborated by Lindsay (1971). If there is no income effect associated with education, the more educated should work more hours, because the remaining substitution effect on labor supply must be positive. But empirical exceptions can be readily found, such as in Colombia where the university educated worked in Bogota less than those with only secondary schooling (Schultz, 1968) and Thailand where in 1981 the more educated worked fewer hours per month, or in Indonesia in 1986 where men with more university training worked fewer hours (Behrman and Deolalikar, 1988b). Thus, in reality, both an income and substitution effect may be associated with the acquisition of schooling, and it can be argued that the return to schooling should include the income effect but exclude the labor supply effect induced by the substitution effect. In practice, if the dependent variable of the earnings function is the logarithm of the hourly wage rate, the coefficient on years of schooling approximates the private rate of return, holding labor supply constant. This procedure is correct if the income effect is negligible, as assumed in the equilibrium investment model. It is an underestimate of the private rate of return to

schooling if the more educated work fewer hours.

21/Becker (1964) used the average earnings (of those with earnings) from tabulations of the 1950 Census and apparently then deflated these benefit streams by participation rates. This approach ignored the sample selection of those who had positive earnings, as well as the problem of mixing productivity per hour and labor supply responses associated with education. Mincer (1974) examined the 1960 Census public use sample, and fit the individual's logarithm of annual earnings to education and other variables. He could only include individuals with positive earnings and no correction for the potential bias is discussed from his analysis of a selected sample. However, Mincer's and Becker's analysis is focused on males and not females.

A shortcoming of the sample selection correction methodology, as it is commonly applied, is that it can lead one to conclude incorrectly that there is no sample selection bias, because the sample selection rule is not "well" identified. The only basis for identification can be the functional form assumed for the error in the selection rule equation, e.g. normally distributed (Heckman, 1979). More confidence can be placed in the estimates if theory prescribes conditioning variables that enter significantly in the sample selection rule equation, but are excluded <u>a priori</u> from the market wage equation. Thus, an insignificant sample selection term (i.e. Heckman's lambda) may become statistically significant when the exclusionary restrictions of the model are selected with more care. As a consequence, the sample selection correction procedure may then change the estimated returns to schooling. Agreement on acceptable criteria for identification would accelerate advancement of empirical research on this topic.

22/The nonmarket reservation wage of the wife is affected by the family's land, ownership of a business, assets, nonearned income, and the husband's education and experience. These variables are added to the wage-status probit equation. The Heckman (1979) two stage estimate that is less efficient yields an estimate of returns of .16 (Griffin, 1987; Table 3).

23/Alternative specifications can include the age and education of the spouse or the predicted wage of the spouse and a marital status dummy variable if these characteristics of the spouse are missing. These identifying variables are believed to be more likely to be endogenous than the land and nonearned income variables. But their inclusion in the model does not change appreciably the estimates of the private rates of return reported in Table 3 (Schultz, 1988c).

24/Taxes on personal income are a relatively small portion of government revenues in low income countries. The exception may be Latin America if one includes "social security" taxes (World Bank, 1988: 84). In the case of Thailand in 1981, direct taxes on personal incomes amounted to less than 5 percent of household expenditures and only 10 percent of wage recipients in Bangkok (National Statistical Office, undated). Most of government revenues in low income countries are from taxes on companies and commodities (excise and trade). This adjustment may therefore be of secondary importance in low income countries but could be quite important in industrially advanced countries.

25/ The marginal revenue generated by the expansion of education for women, E_w, and men E_m, can be expressed:

$$dR/dE_w = tw_w\alpha_{1w}(\beta_{1w} + \beta_{2m})$$

$$dR/dE_m = tw_m\alpha_{1m}(\beta_{1m} + \beta_{2w})$$

where $\alpha_{1m} = \alpha_{1w}$ are the private rates of return to schooling of men and women which are assumed equal, $\beta_{1w} > 0$ is the wife's uncompensated own wage effect, $\beta_{2w} < 0$ is the wife's uncompensated husband's wage effect, $\beta_{1m} \leq 0$ is the husband's uncompensated own wage effect, and $\beta_{2m} \simeq 0$ is the husband's uncompensated wife's wage effect. The above indicated signs are those commonly obtained in static instrumented family labor supply models (Cogan, 1980a; Schultz, 1981).

26/ A parallel public finance argument can be made for taxing more heavily inelastically supplied factors, if the goal is not to distort the optimal (i.e. untaxed) allocation of factors. This tax criterion implies that given the labor supply parameters outlined in footnote 25 that male labor incomes should be taxed more heavily than female labor incomes because they are inelastically supplied. I have not seen an endorsement of such an optimal tax policy.

27/ The expected years of education reported in Table 5 is a synthetic cohort measure, defined as the sum of the three commonly reported age-specific enrollment rates--associated approximately with primary, secondary, and higher educational levels--weighted by the six year length of the age intervals used to compute each of the enrollment rates. Thus it represents the number of

years an individual would enroll in school if he or she enrolled at the average rates from age 7 to age 25 reported in a particular year. There are many reasons to suspect that these enrollment rates exceed attendance rates, and the actual time and effort applied to schooling undoubtedly differs greater across countries and over time within countries. There may also be differences in these "real" investment rates per year of enrollment between boys and girls, but they are not reflected in any of these UNESCO statistics.

28/ There are few quantitative studies that seek to test the efficacy of public policy that varies (1) the mix of women and men hired to extend new agricultural technologies, (2) the sex of the agricultural worker these personnel have contacted, (3) the reported source of innovative practices or new productive inputs, and finally (4) the effects on the hourly productivity of male and female workers and managers, as well as their overall earnings. One description of the agricultural extension program in Malawi (Spring et al., 1983) shows the growing predominance of women full-time and part-time workers and managers. Female headed households and wives, however, benefit from relatively fewer extension visits than do men. But women attribute to extension agents their sources of modern agricultural practices more than do men. One interpretation of these data from Lilongwe Rural Development Project is that women agricultural workers are more responsive to the extension inputs they received. But they received fewer such inputs. Unfortunately, the education of the male and female farm managers and their size of holdings are not reported, and these characteristics of the farmers might help to explain the reported patterns. None of 50 extension evaluation studies reviewed by Evenson (1988) or Birkhaeuser et al. (1988) note the differential effective-

ness of male and female staff or the gender of farm contacts.

29/There are also numerous more specialized tasks in the delivery of health care where less highly trained (and less costly) paramedics who are dedicated to performing a few functions can do these activities better than, or at least as well as, doctors. In Thailand midwives were trained to insert IUDs. They were then carefully evaluated against doctors providing the same service. The midwives were more successful in delivering this single service than were the doctors. Performance was measured in terms of the incidence of a variety of objective complications and in terms of patient satisfaction and frequency of complaints (Population Council, 1972).

REFERENCES

Acharya, M. and L. Bennett (1983) "Women and the Subsistence Sector," World Bank Staff Working paper No. 526, The World Bank, Washington, D.C.

Aird, J. S. (1983) "The Preliminary Results of China's 1982 Census," The China Quarterly, 96:613-640 (December).

Altimir, O. (1984) "Poverty Income Distribution and Child Welfare in Latin America: A Comparison of Pre- and Post- Recession Data", World Development, 12:3 (March).

Amin, S. and A.R. Pebley (1987) "The Impact of a Public Health Intervention on Excess Female Mortality in Punjab, India," Princeton, New Jersey, mimeo.

Anderson, K.H. (1982) "The Sensitivity of Wage Elasticities to Selection Bias and the Assumption of Normality," Journal of Human Resources 17:4 (Fall) 594-605.

_____ and M.A. Hill (1980) "Determinants of Age at Marriage in Malaysia and Japan," Economic Growth Center Discussion Paper 351, New Haven, CT (June).

Anonymous (1988), "A Murderous Tradition", India Today, (October 31), pp. 22-24.

Anonymous (1987) "Maternal Health in subSaharan Africa," The Lancet, January 31, pp. 255-257.

Ashenfelter, O. and J. J. Heckman (1974) "The Estimation of Income and Substitution Effects in a Model of Family Labor Supply," Econometrica, 42:73-85, (January).

Azcona, S.C., M. del C. Elu de Lenero, J.C. Cordero and A. Keller (1980) "Agent Characteristics and Productivity in the Mexican Rural Health Program," Studies in Family Planning 11:7/8 (July/August) 247-54.

Bamberger, J. (1974) "The Myth of Matriarchy," Women, Culture, and Society (eds.) M.Z. Rosaldo and L. Lamphere. Stanford, CA: Stanford University Press.

Bardhan, P.K. (1984) Land, Labor and Rural Poverty: Essays in Development Economics. New York: Columbia University Press.

Barrera, A. (1988a) "The Role of Maternal Schooling and Its Interaction with Public Health Programs in Child Health Production," Economic Growth Center Discussion Paper No. 551, Yale University, forthcoming in Journal of Development Economics.

_____ (1988b) Maternal Schooling and Child Health, unpublished Ph.D. dissertation, Yale University, New Haven, CT.

Basu, A.M. (1987) "Household Influences on Childhood Mortality," Social Biology 34:3-4 (Fall-Winter) 187-205.

Bauer, J. and Y-S. Shin (1987) "Female Labor Force Participation and Wages in the Republic of Korea," Working Paper East-West Population Institute No. 54, Honolulu, Hawaii.

Becker, G.S. (1964) Human Capital, New York: Columbia University Press.

_____ (1965) "A Theory of the Allocation of Time," Economic Journal 75:299 (December) 493-517.

_____ (1974) "A Theory of Marriage," in Economics of the Family, (ed.) T. W. Schultz, Chicago: University of Chicago Press.

_____ (1981) A Treatise on the Family, Cambridge, MA: Harvard University Press.

_____ (1985) "Human Capital, Effort and the Sexual Division of Labor," Journal of Labor Economics 3: 533-558.

_____ E.M. Landes, and R.T. Michael (1977) "An Economic Analysis of Marital Instability," Journal of Political Economy 85:5 (December) 1141-1187.

_____ and N. Tomes (1979) "An Equilibrium Theory of the Distribution of Income and Intergenerational Mortality," Journal of Political Economy, 87:(6); 1141-1187.

Behm, H. (1976) La Mortalidad en los Primeros Anos de Vida en los Paises de America Latina, San Jose, Costa Rica: CELADE.

_____ (1980) "Socioeconomic Determinants of Mortality in Latin America" in Socioeconomic Determinants and Consequences of Mortality, WHO, Geneva.

Behrman, J.R. (1988) "Intrahousehold Allocation of Nutrients in Rural India", Oxford Economic Review, 40:1 (March) 32-54.

_____ and N. Birdsall (1983) "The Quality of Schooling," American Economic Review 73:5 (December) 928-946.

_____ and A. Deolalikar (1988a) "Health and Nutrition" in H. Chenery and T.N. Srinivasan (eds.) Handbook on Economic Development Vol. 1, Chapter 15, Amsterdam: North Holland Publishing Company.

_____ and A. Deolalikar (1988b) "Are There Differential Returns to Schooling by Gender?", Development Studies Project II Research Paper, Jakarta, Indonesia.

_____ and A. Deolalikar, and B.L. Wolfe (1988) "Nutrients: Impacts and Determinants", The World Bank Economic Review, 2:3 ( ) 299-320.

_____ and L. Lanzona (1987) "Time Use and Modern Rice Technologies in the Philippines," Mimeo, University of Pennsylvania (November Draft).

_____ and B.L. Wolfe (1984) "More Evidence on Nutrition Demand; Income Seems Overrated and Women's Schooling Underemphasized," Journal of Development Economics 14: 105-128.

_____ and B.L. Wolfe (1987) "How Does Mother's Schooling Affect Family Health, Nutrition, Medical Care Usage and Household Sanitation", Journal of Econometrics, 36: 185:204.

Bell, C. and T.N. Srinivasan (1985) "Agricultural Credit Markets in Punjab: Segmentation, Rationing and Spillover," RPO 671-89, Working Paper No. 7, World Bank, Washington, D.C. (June).

Benham, L., (1975) "Nonmarket Returns to Women's Investment in Education", in C.B. Lloyd (ed.) Sex, Discrimination and the Division of Labor, New York: Columbia University Press.

Berger, M., V. DeLancey and A. Mellencamp (1984) "Bridging the Gender Gap in Agricultural Extension," International Center for Research in Women, Washington, DC.

Binswanger, H. P., R. E. Evenson, C. A. Florencio and B. N. F. White (eds.) (1980) Rural Household Studies in Asia, Singapore: Singapore University Press.

Birdsall, N. and M.L. Fox (1985) "Why Males Earn More" Economic Development and Cultural Change, 33:3 (April) 533-556.

_____ and W.P. McGreevy (1983) "Women, Poverty and Development" in Women and Poverty in the Third World, (eds.) M. Buvinic, M.A. Lycette, and W. P. McGreevy, Baltimore, MD: Johns Hopkins University Press.

Birkhaeuser, D., R. Evenson, and G. Feder (1988) "The Economic Impact of Agricultural Extension: A Review," Processed, the World Bank, Washington, D.C. (October).

Blau, D. (1984) "A Model of Child Nutrition, Fertility and Women's Time Allocation," in T.P. Schultz and K.I. Wolpin (eds.) Research in Population Economics, Vol. 5, Greenwich, CT: JAI press.

Blumberg, R.L. (1984). "A General Theory of Gender Stratification," in Sociological Theory 1984, (ed.) R. Collins, pp. 23-101, San Francisco, CA: Jossey Bass.

_____ (1988) "Income under Female Versus Male Control: Differential Spending Patterns and the Consequences when Women Lose Control of Returns to Labor," Working paper draft, Women in Development Division, The World Bank, Washington, DC.

Boserup, E. (1965) The Conditions of Agricultural Growth, Chicago: Aldine Publishing Co., Chicago.

_____ (1970) Women's Role in Economic Development, New York: St. Martin's Press.

Boulier, B.L. and M.R. Rosenzweig (1984) "Schooling, Search and Spouse Selection", Journal of Political Economy, 92:4 (August) 712-732.

Briscoe, J. (1987) "A Role for Water Supply and Sanitation in the Child Survival Revolution" PAHO Bulletin, 21(2), 93-105.

Bryant, W.K. (1986) "Technical Change and the Family: An Initial Foray," Human Resources Research, 1887-1987 (eds.) R.E. Deacon and W.E. Huffman, Iowa State University, College of Home Economics, Ames, Iowa.

Butz, W. and J. DaVanzo (1978) The Malaysian Family Survey: Summary Report, Santa Monica, CA: The Rand Corporation (March).

_____ H.P. Habicht, and J. DaVanzo (1984) "Environmental Factors in the Relationship between Breastfeeding and Infant Mortality," American Journal of Epidemiology 119:4, pp. 516-525.

Buvinic, M., M. Lycette, W.P. McGreevy (eds.) (1983). Women and Poverty in the Third World, Baltimore, MD: Johns Hopkins University Press.

Caldwell, J.C. (1968) "Determinants of Rural-Urban Migration in Ghana," Population Studies, 22:3 (November).

_____ (1979) "Education as a Factor in Mortality Decline," Population Studies 33: 395-413.

_____ and P. Caldwell, 1987, "The Cultural Context of High Fertility in Subsaharan Africa", Population and Development Review, 13:3 (September) 409-437.

_____ and P. McDonald, (1981) "Influence of Maternal Education on Infant and Child Mortality: Levels and Causes," in International Population Conference Manila, Vol. 2, Liege: IUSSP.

Carlin, P.S. (1988) "IntraFamily Bargaining and Time Allocation," Research in Population Economics, Vol. 7, (ed.) T. P. Schultz (forthcoming).

Catsiapis, G. and C. Robinson, (1982), "Sample Solution Bias with Multiple Selection Rules", Journal of Econometrica, 18: 351-368.

Chamratrithirong, A. (ed.) (1984) Perspectives on the Thai Marriage: A Review of Demographic Evidence, Mahidol University, Institute for Population and Social Research, Salaya, Thailand.

Charbonneau, R., 1988, "The Trouble with Girls: Sexual Discrimination in the Punjab", IDRC Reports, 17: 4 (October) 6-7.

Chen, L., A. Chowdhury and S. Hoffman (1980) "Anthropometric Assessment of Energy-Protein Malnutrition and Subsequent Risk of Mortality during Preschool Aged Children," American Journal of Clinical Nutrition 33 (August) 1836-1845.

_____ E. Hug, and S. D'Souza (1981) "Sex Bias in the Family Allocation of Food and Health Care in Rural Bangladesh," Population and Development Review 7:1 (March) pp. 55-70.

Cherlin, A. and A. Chamratrithirong (1988) "Variations in Marriage Patterns in Central Thailand," Demography 25:3 (August) 337-353.

Chernichovsky, D., N.S. Kielmann, A. Kielmann, and W. Reinke (1983) "Correlates of Preschool Child Growth in Rural Punjab," in Arnfreid Kielmann and Associates, ed., Child and Maternal Health Services in Rural India: The Narangwal Experiment, Baltimore, MD: Johns Hopkins Press.

_____ and O.A. Meesook (1985) "School Enrollment in Indonesia", World Bank Staff Working Paper No. 746, World Bank Washington D.C. (August).

_____ and L. Zangwill (1988) "Microeconomic Theory of the Household and Nutrition Programs," Population and Human Resources Dept. Working Paper 82, The World Bank, Washington, D.C.

Chiappori, D.A. (1988) "Nash Bargained Household Decisions," International Economic Review, 29:4 (September) 791-796.

Chidabarum, V.C., J.W. McDonald, and M. D. Bracher (1987) "Childhood Mortality" in The World Fertility Survey (eds.) J. Cleland and C. Scott, London: Oxford University Press.

Chiswick, C.U., (1976), "On Estimating Earnings Functions for LDCs", Journal of Development Economics, 4: 67-78.

Cochrane, S.H. (1979) Fertility and Education, Baltimore, MD: Johns Hopkins University Press.

_____ J. Leslie, D. J. O'Hara (1980) "The Effects of Education on Health," The World Bank Staff Working Paper 405, Washington, DC.

Cogan, J. (1980a) "Married Women's Labor Supply: A Comparison of Alternative Estimates," in Female Labor Supply (ed.) J.P. Smith, Princeton, N.J.: Princeton University Press.

_____ (1980b) "Labor Supply with Costs of Labor Market Entry," in Female Labor Supply (ed) J.P. Smith, Princeton, N.J.: Princeton University Press.

Cotlear, D. (1986) "Farmer Education and Farm Efficiency in Peru," Education and Training Dept. Discussion Paper 49, Washington, DC: The World Bank.

DaVanzo, J. (1972) Determinants of Family Formation in Chile, 1960, Santa Monica, CA: The Rand Corporation (August).

_____ (1984) "Child Mortality Determinants in Malaysia" in Child Survival (eds.) W.H. Mosley and L.C. Chen, Population and Development Review, Supplement to Vol. 10.

Davision, J. (1988) Agriculture, Women, and Land: The African Experience, Boulder, CO: Westview Press.

Deaton, A. (1986) "On Measuring Child Costs: With Applications to Poor Countries," Journal of Political Economy 94:4 (August) 720-744.

Deolalikar, A. (1988) "Nutrition and Labor Productivity in Agriculture," Review of Economics and Statistics 70:3 (August) 406-413.

_____ and V.P.M. Vijverberg (1983) "Heterogeneity of Family and Hired Labor in Agriculture: A Test Using Farm Level Data from India and Malaysia," Discussion Paper No. 444, New Haven, CT: Economic Growth Center, Yale University (September).

DeTray, D., (1988) "Government Policy, Household Behavior and the Distribution of Schooling," in Research in Population Economics Vol. 5, (ed.) T.P. Schultz, Greenwich: CT: JAI Press.

Dixon, R.B. (1978) Rural Women at Work, Johns Hopkins University Press: Baltimore, MD.

Durand, J.D. (1975) The Labor Force in Economic Development, Princeton, NJ: Princeton University Press.

Duraisamy, P. (1988) "An Econometric Analysis of Fertility, Child Schooling and Labour Force Participation of Women in Rural Indian Households", Journal of Quantitative Economics, 4:2 (July) 293-316.

_____ (1988) "The Effects of Education on Market and Nonmarket Activities: A Survey", Journal of Madras University Madras, India, pp. 1-11.

Dyson, T. (1977) "Levels, Trends, Differentials and Causes of Childhood Mortality: A Survey," World Health Statistics Report.

ECIEL (1982) Determinantes de la Oferta de Trabajo en America Latina, Programa de Estudios Conjunctos sobre Integracion Economica Latinoamerica, Rio de Janeiro, Brazil.

El Badry, M.A. (1969) "Higher Female Than Male Mortality in Some Countries of South Asia", Journal of the American Statistical Association, 64(328): 1234-1244 (December).

Ember, C.R. (1983) "The Relative Decline in Women's Contribution to Agriculture with Intensification," American Anthropologist, 85: 285-304.

England, P. and G. Farkas (1986) Households Employment and Gender, New York: Aldene Publishing Company.

Estrey, S.A. and J.P. Habicht (1987) "Maternal Literacy Modifies the Effect of Toilets and Piped Water on Infant Survival in Malaysia," processed, Cornell University, Ithaca, NY.

Evenson, R.E. (1976) "On the New Household Economics", Journal of Agricultural Economics and Development, 6 (January), 87-103.

_____ (1983) "The Allocation of Women's Time: An International Comparison," Behavioral Science Research 17:3-4 (Spring-Summer) 196-218.

_____ (1985) "Observations on Institutions, Infrastructure Technology and Women" in Women in Rice Farming, International Rice Research Institute, London: Gower Pub. Co.

_____ (1987) The International Agricultural Research Centers, CGIAR Study Paper No. 22, The World Bank, Washington, D.C. (April).

_____ (1988) "Economic Issues in Agricultural Extension Policy." Processed, Economic Growth Center, Yale University, New Haven, CT.

Fabella, R.V. (1982) "Economies of Scale in the Household Production Model and Intrafamily Allocation of Resources," Unpublished Ph.D. dissertation, Yale University, New Haven, CT.

Farah, A. A. and S. H. Preston (1982) "Child Mortality Differentials in Sudan," Population and Development Review, 8:365-383, (June).

Feder, G., R.H. Slade and A.K. Sundaram (1985) "The Training and Visit Extension System," World Bank Staff Working Paper No. 719, The World Bank, Washington, D.C.

Falaris E., (1987), A Nested Logit Migration Model with Selectivity" International Economic Review, 28:2 (June), 429-434.

Folbre, N. (1986) "Cleaning House", Journal of Development Economics, 22 5-40.

_____ (1984a) "Household Production in the Philippines", Economic Development and Cultural Change, 32:2 (January) 303-330.

_____ (1984b) "Market Opportunities, Genetic Endowments, and Intrafamily Resource Distribution: Comment", American Economic Review, 74:3 (June) 518-520.

Frank, O. (1988) "The Childbearing Family in subSaharan Africa: Structure, Fertility and the Future," WHO, Geneva draft (October).

Freiden, A. (1974) "The U. S. Marriage Market," in Economics of the Family, (ed.) T. W. Schultz, Chicago: University of Chicago Press.

Freedman, R., X. Zhenyu, L. Bohua, and W. Lavely, "Local Area Variation in Reproductive Behavior in the PRC 1973-1982", Population Studies 42: 1 (March) 39-57.

Friedl, E. (1975) Women and Men: An Anthropologist's View. Basic Anthropology Units. New York: Holt, Rinehart and Winston.

Gannicott, K. (1986) "Women, Wages, and Discrimination: Some Evidence from Taiwan," Economic Development and Cultural Change 34(4) 721-730 (July).

Gertler, P. and P. Gleewe (1988) "Demand for Education in Peru," mimeo, The World Bank, Washington, DC.

Gladwin, C.H. and D. McMillary (1989) "Is a Turnaround in Africa Possible Without Helping African Women to Farm?" Economic Development and Cultural Change 37:2 (January), 345-369.

Goldin, C. (1983), "The Changing Economic Role of Women: A Quantitative Approach," Journal of Interdisciplinary History 14:1 (Spring) 707-733.

_____ (1989), "Life cycle Labor Force Participation of Married Women: Historical Evidence and Implications," Journal of Labor Economics 7:1 (January) 20-47.

Goode, W.J. (1963) World Revolution and Family Patterns, New York: Free Press.

Goody, J. (1987) "Futures of the Family in Africa," presented at Yale Labor and Population Workshop (November).

Grave, R., (1979) "Ability in Pre-Schoolers, Earnings and Home Environment", World Bank Staff Working Paper No. 322, Washington D.C.

Greenholgh, S. (1985) "Sexual Stratification: The Other Side of 'Growth with Equity' in East Asia," Center for Policy Studies Working Paper No. 111 (April).

Gregory P. (1986) The Myth of Market Failure: Employment and the Labor Market in Mexico. Baltimore, MD: Johns Hopkins University Press.

_____ (1980) "An Arrangement of Changes in Employment Conditions in Less Developed Countries", Economic Development and Cultural Change 26: 673-700.

Griffin, C.G. (1987) "Methods for Estimating the Value of Time with an Application to the Philippines," mimeo, University of Oregon (November).

Griliches, Z. (1977) "Estimating the Returns to Schooling," Econometrica 45:13, 1-22, (January).

_____ (1979) "Sibling Models and Data in Economics" Journal of Politial Economy 87:5 (October) S37-S64.

Gronau, R. (1974) "The Effect of Children on the Housewife's Value of Time" in Economics of the Family, (ed.) T.W. Schultz, Chicago IL: University of Chicago Press.

_____ (1980) "Home Production: A Forgotten Industry," Review of Economics and Statistics 62:3 (August) 408-416.

_____ (1988) "Consumption Technology and the Intrafamily Distribution of Resources: Adult Equivalence Scales Reexamined," Journal of Political Economy 96:6 (December) 1183-1205.

Grossbard, A., (1976), "An Economic Anlysis of Polygyny: The Case of Maiduguri," Current Anthropology, 17: 4, 701-707.

Gubhaju, B.B., M.K. Choe, R.D. Retherford, and S. Thapa (1987) "Infant Mortality Trends and Differentials in Nepal," Studies in Family Planning 18:1 (January/February) pp. 22-31.

Haggblade, S. (1987) "Vertical Considerations in Choice of Technique Studies: Evidence from Africa's Indigenous Beer Industry," Economic Development and Cultural Change 35:4 (July) 723-742.

Haines, M.R. and R.C. Avery (1982) "Differentials in Infant and Child Mortality in Costa Rica," 1968-73, Population Studies 36:31-44.

Hanoch, G. (1967) "An Economic Analysis of Earnings and Schooling", Journal of Human Resources, 2:3 (Summer) 310-329.

Haveman, R. and B. Wolfe (1984) "Education and Economic Well Being: The Role of Nonmaarket Effects," Journal of Human Resources 19:377-407.

Hay, J.W. (1984) "Occupational Choice and Occupational Learnings," in (eds.) T.P. Schultz and K.I. Wolpin, Research in Population Economics, Vol. 5, Greenwich, CT: JAI Press.

Heckman, J.J. (1971) "Three Essays on the Supply of Labor and the Demand for Goods," unpublished Ph.D. dissertation, Princeton University (May).

_____ (1974) "Shadow Prices, Market Wages and Labor Supply," Econometrica 42:679-694.
_____ (1979) "Sample Bias as a Specification Error," Econometrica 47:1 (January) 153-162.
_____ (1987) "Selection Bias and Self Selection," The New Palgrave: A Dictionary of Economics, London: Macmillan Press.
_____ and S. Polachek (1974) "Empirical Evidence on the Functional Form of the Earnings-Schooling Relationship," Journal of the American Statistical Association 69:346 (June).
_____ and G. Sedlachek, (1985), "Heterogeneity aggregation and market wage functions", Journal of Political Economy, 93:5 (December) 1077-1125.
Heller, P. and W. Drake (1979) "Malnutrition, Child Morbidity, and the Family Decision Process, Journal of Development Economics 6 (June) 203-235.
Herz, B. (1988) "Women and Kenya's Economic Prospects," Mimeo, The World Bank, Washington, DC (September).
_____ and A. P. Measham (1987) "The Safe Motherhood Initiative: Proposals for Action," World Bank Discussion Paper No. 9, The World Bank, Washington, D.C.
Hill, P. (1963) Migrant Cocoa Farmers of Southern Ghana, Cambridge: Cambridge University Press.
Hill, M. A. (1983) "Female Labor Force Participation in Developing and Developed Countries," Review of Economics and Statistics 65:3, 459-468.
Hill, R.C. and F.P. Stafford (1980) "Parental Care of Children", Journal of Human Resources, 15:2 (Spring) 211-239.
Hines, F., L. Tweeten, and M. Redfern (1970) "Social and Private Rates of Return to Investment in Schooling by Race-Sex Groups and Regions," Journal of Human Resources 5:3, 318-340 (Summer).
Hobcraft, J.N., J.M. McDonald, and S.O. Rutstein (1984) "Socioeconomic Factors in Infant and Child Mortality" Population Studies 38(2):363-385.
Horney, M.J. and M.B. McElroy (1988) "The Household Allocation Problem: Empirical Results from a Bargaining Model," in Research in Population Economics Vol. 6 (ed.) T.P. Schultz, Greenwich, CT: JAI Press.
Horton, S. (1988) "Birth Order and Child Nutritional Status: Evidence from the Philippines," Economic Development and Cultural Change, 36 (January) 341-354.
Hossain, M. (1987) "Credit for Alleviation of Rural Poverty: The Experience of the Grameen Bank of Bangladesh," IFPRI and BIDS, July.
_____ and R. Afsar (1988) "Credit for Women: A Review of Special Credit Programmes in Bangladesh," Human Resource Development Division, Bangladesh Institute of Development Studies, Dhaka.
IRRI (International Rice Research Institute) (1985) Women in Rice Farming, London: Gower Publishing Co.
Jacoby, H. (1988) "A Shadow Wage Approach to Estimating a Family Labor Supply Model for Rural Peru," Mimeo, University of Chicago, (February).
Jamison, D.T. and P.R. Moock (1984) "Farmer Education and Farm Efficiency in Nepal," World Development 12(1) 67-86.
Joekes, S. (1987) Women in the World Economy, New York: Oxford University Press.
Jones, C.N. (1986) "Intra-Household Bargaining in Response to the Introduction of New Crops," in Understanding Africa's Rural Households and Farming Systems, (ed.) J.L. Moock, Boulder, CO: Westview Press.
Judd, M.A., J.K. Boyce, and R.E. Evenson (1986) "Investing in Agricultural Supply," Economic Development and Cultural Change 35(1) 77-114 (October).

Kennedy, E.T. and B. Cogill (1986) "Income and Nutritional Effects of the Commercialization of Agriculture: The Case of Kenya," Mimeo, International Food Policy Research Institute, Washington, DC (December).

Khan, M.E., R. Anker, S.K. Ghosh Dastidar and S. Bairathi (1987) "Inequalities Between Men and Women in Nutrition and Family Welfare Services: An In-Debth Enquiry in an Indian Village", Population and Labour Policies Programme ILO, Geneva.

Khandker, S.R. (1987) "Labor Market Participation of Married Women in Bangladesh," Review of Economics and Statistics 69:3 (August) 536-541.

_____ (1988) "Determinants of Women's Time Allocation in Rural Bangladesh," Economic Development and Cultural Change 37:1 (October) 111-126.

_____ (1989), "Returns to Schooling and Male-Female Wage Differences in Peru," PHRWD, The World Bank, Washington D.C., processed (February).

King, E. M. (1988) "Does Education Pay in the Labor Force," Population and Human Resources Dept., The World Bank, Washington, DC (September).

_____ and R. Bellew (1988) "Education Policy and Schooling Levels in Peru: Patterns and Explanations," Mimeo, The World Bank, Washington, DC (May).

_____, J.R. Peterson, S.M. Adioetomo, L.J. Domingo, and S.H. Syed (1986) Change in the Status of Women Across Generations in Asia, Santa Monica, CA: The Rand Corp. (December).

Kniesner, T.J., M.B. McElroy and S.P. Wilcox (1987) "Family Structure, Race, and the Hazards of Young Women in Poverty," Working Paper No. 86-9, University of North Carolina, Chapel Hill, NC.

Knight, J.B. and R.H. Sabot (1982) "Labor Market Discrimination in a Poor Urban Economy." Processed, World Bank, Washington, D.C. (January).

Knodel, J., A. Chamrathrithirong, and N. Debavalya (1987) Thailand's Reproductive Revolution. Madison, WI: University of Wisconsin Press.

Kooreman, P. (1988), "Household Labor Force Participation as a Cooperative Game: An Empirical Model", Tilburg University, Netherlands, processed (April).

Kosters, M. (1966) Income and Substitution Effects in a Family Labor Supply Model, Santa Monica, CA: The Rand Corporation.

Kusnic, M.W. and J. DaVanzo (1980) Income Inequality and the Definition of Income: The Case of Malaysia, R-2416-AID, Santa Monica, CA: The Rand Corp. (June).

Kuznets, S. (1957) "Quantitative Aspects of the Economic Growth of Nations: II, Industrial Distribution of National Product and Labor Force," Economic Development and Cultural Change 5 (Supplement).

_____ (1966) Modern Economic Growth: Rate Structure and Spread, New Haven, CT: Yale University Press.

Kynch, J. and A. Sen (1983), "Indian Women: Well Being and Survival," Cambridge Journal of Economics, 7, 363-380.

Lam, D. (1988) "Assortative Mating with Household Public Goods," Journal of Human Resources, 23:4 (Fall) 462-487.

Layard, R. and J. Mincer (eds.) (1985) "Trends in Women's Work, Education, and Family Building," Journal of Labor Economics 3:1, pt. 2 (January).

Lehrer, E. (1978) "Women's Allocation of Time Over the Life Cycle," Unpublished Ph.D. dissertation, Northwestern University.

Leibowitz, A. (1974) "Home Investments in Children," in Economics of the Family (ed.) T.W. Schultz, Chicago: University of Chicago Press.

Lele, U. (1975) The Design of Rural Development, Baltimore, MD: Johns Hopkins University Press.

_____ (1986) Women and Structural Transformation," Economic Development and Cultural Change, 34:2 (January) 195-221.

Levy, V. (1985) "Cropping Pattern, Mechanization, Child Labor and Fertility in a Farming Economy: Rural Egypt," Economic Development and Cultural Change 33(4) 777-792 (July).

Lillard, L.A. and E.M. King (1984) "Methods for Analyzing School Choice with Household Survey Data." Rand Corporation Note N-1963-AID, Santa Monica, CA (July).

Lindert, P. (1978) Fertility and Scarcity in America, Princeton, NJ: Princeton University Press.

Lindsay, C.M. (1971) "Measuring Human Capital Returns," Journal of Political Economy, 79:6, 1195-1215 (November/December).

Lloyd, C.B., E.S. Andrews, and C.L. Gilroy (eds.) (1979) Women in the Labor Market, New York: Columbia University Press.

Lockheed, M.E., D.T. Jamison, and L.J. Lau (1980) "Farmer Education and Farm Efficiency: A Survey," Economic Development and Cultural Change 29 (1) 37-76.

Lopez, A. and L. Ruzicka (eds.) (1983) Sex Differences in Mortality, Department of Demography, Australian National University, Canberra.

Lundberg, S. (1988) "Labor Supply of Husbands and Wives: A Simultaneous Equation Approach," Review of Economics and Statistics 70:2 (May) 224-235.

Lycette, M.A. (1986) "Improving Basic Educational Opportunities for Women in Developing Countries," International Center for Research on Women, Washington, D.C. (October).

McElroy, M.B. (1988) "The Empirical Content of Nash-Bargained Household Behavior," Economics Department Discussion Paper No. 88-08, Duke University (September).

_____ and M.J. Horney (1981) "Nash Bargained Household Decisions," International Economic Review, 22:333-350, (June).

Manser, M. and M. Brown (1979) "Bargaining Analysis of Household Decisions," in C.B. Lloyd, E.S. Andrews and C.L. Gilroy (eds.) Women in the Labor Force, New York: Colombia University Press.

_____ and _____ (1980) "Marriage and Household Decisionmaking: A Bargaining Analysis," International Economic Review 21:1 (February) 31-44.

Marini, M.M. (1987) "Sex and Gender" in The Future of Sociology, (eds.) E.F. Borgatta and K.S. Cook. Beverly Hills CA: Sage Pub.

Martorell, R. J. Leslie and P. Moock (1984) "Characteristics and Determinants of Child Nutritional Status in Nepal" American Journal of Clinical Nutrition) 39:1, pp. 74-86.

Mason, K.O. (1984) The Status of Women, New York: The Rockefeller Foundation.

Maurer, K., R. Ratajiczak, and T.P. Schultz (1973) Marriage, Fertility, and Labor Force Participation of Thai Women, R-829 Santa Monica, CA: The Rand Corp. (April).

Meegama, S.A. (1981) "The Decline in Mortality in Sri Lanka in Historical Perspectives," in Proceedings of the IUSSP Conference, Manila.

Mensch, B., H. Lentzner and S. Preston (1986) Socioeconomic Differentials in Child Mortality in Developing Countries. New York: United Nations.

Merrick, T. W. (1978) "Fertility and Land Availability in Rural Brazil,"Demography, 15:321-336, (August).

Michael, R.T. (1972), The Effect of Education on Efficiency in Consumption, Occasional Paper 116, NBER, New York: Columbia University Press.

_____ (1982) "Measuring Nonmonetary Benefits of Education," in W.W. McMahon and T.G. Geske (eds.) Financing Education, Urbana, IL: University of Illinois Press.

Mincer, J. (1963) "Market Prices, Opportunity Costs and Income Effect," in Measurement in Economics (eds.) C. Christ et al., Stanford, CA: Stanford University Press.

_____ (1974) Schooling Experience and Earnings New York: Columbia University Press.

Mohan, R. (1981) "The Determinants of Labor Earnings in Developing Metropolises: Estimates from Bogota and Cali," World Bank Staff Working Paper No. 650, Washington, D.C.

_____ (1985) "Labor Force Participation in a Developing Metropolis: Does Sex Matter?" World Bank Staff Working Paper No. 749, The World Bank, Washington, D.C.

_____ (1986) Work Wages and Welfare in a Developing Metropolis. New York: Oxford University Press.

Montgomery, M. and D. Sulak (1988) "Female First Marriage in East and Southeast Asia," Journal of Development Economics, forthcoming.

_____ and J. Trussell (1986) "Models of Marital Status and Childbearing" in Handbook of Labor Economics, Vol. I, eds. O.C. Ashenfelter and R. Layard, Amsterdam: North Holland Publ.

Moock, J. L. (1986) Understanding Africa's Rural Households and Farming Systems. Boulder, Colorado: Westview Press.

Moock, P.R. (1976) "The Efficiency of Women as Farm Managers: Kenya," American Journal of Agricultural Economics (December) 831-835.

_____ (1981) "Education and Technical Efficiency in Small Scale Production," Economic Development and Cultural Change 29:723-739.

_____ and J. Leslie (1986) "Childhood Malnutrition and Schooling in the Terai Region of Nepal," Journal of Development Economics 120:33-52.

Mroz, T.A. (1987) "The Sensitivity of an Empirical Model of Married Women's Hours of Work to Economic and Statistical Assumptions," Econometrica 55:4 (July) 765-799.

Mueller, E. (1984) "Income Aspirations and Fertility in Rural Areas of Less Developed Countries," in W.A. Schutjer and C.S. Stokes (eds.) Rural Development and Human Fertility, New York: Macmillan Publishing Company.

Murdock, G.P. and C. Provost (1973) "Factors in the Division of Labor by Sex: A Cross Cultural Analysis," Ethnology 12: 203-225.

Mushkin, S.J. (1962) "Health as an Investment", Journal of Political Economy, 70:5 pt 2 (October Supplement) 129-157.

National Research Council (1986), Population Growth and Economic Development: Policy Questions, Washington, DC: National Academy Press.

National Statistical Office, undated, Report of the Socioeconomic Survey, 1981 Whole Kingdom, Office of the Prime Minister, Bangkok, Thailand.

Nerlove, S.B. (1974) "Women's Workload and Infant Feeding Practices: A Relationship with Demographic Implications," Ethnology, 13:207-214.

Nerlove, M. and T. P. Schultz, (1970), Love and Life Between The Censuses, Santa Monica CA: Rand Corp., RM-6322-AID.

Newman, J.L. and P. Gertler (1988) "Female Farm Work and Home Work in Rural Cote d'Ivoire," Mimeo, World Bank, Washington, D.C. (April).

Ngwira, N. (1987) "Effectiveness of Agricultural Extension Service in Reaching Rural Women with Timely and Appropriate Agricultural Information," Center for Social Research, University of Malawi (May).

Oaxaca, R. (1973) "Male Female Wage Differentials in Urban Labor Markets," International Economic Review 14(1) 693-709 (October).

Office of the National Education Commission (1987) Costs and Contribution of Higher Education: A Case of Thailand, Bangkok: Educational Research Division.

Osawa, Machiko (1986) "The Wage Gap in Japan: Changing Patterns of Labor Force Participation, Schooling and Tenure," NORC Discussion Paper 86-1, Chicago (April).

Palloni, A. (1981) "Mortality in Latin America: Emerging Patterns," Population and Development Review 7:623-650.

Papa, A.O. (1976) "African Women in Rural Development: Research Trends and Priorities," Overseas Liaison Committee paper No. 12, American Council on Education, Washington, DC (December).

Peters, H.E. (1986) "Marriage and Divorce: Informational Constraints and Private Contracting," American Economic Review 76: 437-454.

Pitt, M. and M.R. Rosenzweig (1985) "Health and Nutrient Consumption Across and Within Households," Review of Economics and Statistics 67 (May) 212-223.

_____ (1988) "Estimating the Intra-family Incidence of Health: Child Illness and Gender Inequality in Indonesian Households," Minneapolis MN: University of Minnesota, processed.

Pollak, R.A. (1985) "A Transaction Cost Approach to Families and Households," Journal of Economic Literature 23: 581-608.

Popkin, B.M. (1980) "Time Allocation of the Mother and Child Nutrition." Ecology of Food and Nutrition 9:1, pp. 1-14.

Population Council (1972) Thailand Country Profile (March) New York City.

Preston, S. (1984) "Children and the Elderly: Divergent Paths for America's Dependents," Demography, 21 (November) 435-457.

_____ and A.T. Richardson, (1975), "Estimating the Proportion of American Marriages That End in Divorce," Sociological Methods and Research, 3: 4, 435-460.

_____ and J.A. Weed (1976) "Causes of Death Responsible for International and Intertemporal Variation in Sex Mortality Differentials," World Health Statistics Report.

Psacharopoulos, G. (1973) Returns to Education, San Francisco: Jossey Bass, Inc.

_____ (1985) "Returns to Education: A Further International Update and Implications", Journal of Human Resources, 20:4, Fall, 583-604.

_____ and M. Woodhall (1985) Education for Development, New York; Oxford University Press.

Ram, R. and T.W. Schultz, (1979), "Life Span, Health, Savings and Productivity", Economic Development and Cultural Change, 27 (April), 399-421.

Repetto, R. (1977) "Correlates of Field Worker Performance in the Indonesian Family Planning Program" Studies in Family Planning 8:1 (January) 19-21.

Rogers, E.M. and D.S. Solomon (1975) "Traditional Midwives and Family Planning in Asia" Studies in Family Planning 6:5 (May) 126-133.

Rosen, S. (1974) "Hedonic Functions and Implicit Markets", Journal of Political Economy, 82: 34-55.

Rosenhouse, S. (1988) "Identifying the Poor: Is Headship a Useful Concept?" Population Council, New York, Draft (October).

Rosenzweig, M.R. (1988) "Risk, Implicit Contacts and the Family in Rural Areas of Low Income Countries," forthcoming Economic Journal.

_____ and R.E. Evenson (1977) "Fertility, Schooling and Economic Contribution of Children in Rural India," Econometrica 45:5 (July) 1065-1079.

_____ and T. P. Schultz (1982a) "Market Opportunities, Genetic Endowments and the Intrafamily Distribution of Resources," American Economic Review, 72:803-815, (September).

_____ and _____ (1982b) "Child Mortality and Fertility in Colombia: Individual and Community Effects," Health Policy and Education, 2: 305-348, Amsterdam: Elsevier Scientific Publishing Co.

_____ and _____ (1985) "The Demand and Supply of Births," American Economic Review, 75:5 (December) 992-1015.

_____ and _____ (1987) "Schooling Information and NonMarket Productivity" Yale University: Economic Growth Center Discussion Paper 490, forthcoming International Economic Review.

_____ and _____ (1989) "The Stability of Household Production Technology: A Replication," Journal of Human Resources 23:4 (Fall) 535-549.

_____ and O. Stark (1988) "Consumption Smoothing, Migration, and Marriage: Evidence from India," forthcoming Journal of Political Economy.

_____ and K.I. Wolpin (1980) "Testing the Quantity-Quality Fertility Model," Econometrica, 48:1 (January) 227-240.

_____ (1982) "Governmental Interventions and Household Behavior in a Developing Country," Journal of Development Economics, 10: No. 2 (October).

_____ (1986) "Evaluating the Effects of Optimally Distributed Public Programs: Child Health and Family Planning Interventions," American Economic Review 76:470-4[illegible].

Ross, J.A., M. Rich, J.P. Molzan, and M. Pensak (1988) Family Planning and Child Survival, Center for Population and Family Health, Columbia University, New York.

Rutstein, S.O. (1983) "Infant and Child Mortality: Levels, Trends, and Demographic Differentials," WFS Comparative Studies No. 24.

Sahn, D.E. and H. Alderman (1988) "The Effect of Human Capital on Wages and the Determinants of Labor Supply in a Developing Country", Journal of Development Economics.

Salaff, J. (1981) Working Daughters of Hong Kong: Filial Piety or Power in the Family, New York: Cambridge University Press.

Schultz, T.P. (1968) Returns to Education in Bogota, Colombia, Santa Monica, CA: The Rand Corp. (September).

_____ (1980a) "Interpretation of the Relations among Mortality, Economics of the Household, and the Health Environment, in Socioeconomic Determinants and Consequences of Mortality Differences, Geneva: WHO.

_____ (1980b) "Estimating Labor Supply Functions for Married Women" in J.P. Smith (ed.) Female Labor Supply, Princeton, NJ: Princeton University Press.

_____ (1981) Economics of Population, Reading, MA: Addison-Wesley.

_____ (1982a) "Notes on the Estimation of Migration Functions," in R.H. Sabot, Migration and the Labor Market in Developing Countries, Boulder, CO: Westview Press.

_____ (1982b) "Lifetime Migration Within Educational Strata", Economic Development and Cultural Change 30:3 (October) 559-593.

_____ (1984) "Studying the Impact of Household Economics and Community Variables on Child Mortality," in Child Survival (eds.) W.H. Mosley and L.C. Chen, Population and Development Review, Supplement to volume 10.

_____ (1986) "Value and Allocation of Time in High Income Countries: Implications for Fertility," in Below Replacement Fertility in Industrial Societies, Supplement Population and Development Review Vol. 12, pp. 87-107.

_____ (1987) "School Expenditures and Enrollments, 1960-1980," in National Academy of Sciences background papers (eds.) D.G. Johnson and R. Lee, Population Growth and Economic Development, Madison, WI: University of Wisconsin Press.

_____ (1988a) "Women's Changing Participation in the Labor Force: A World Perspective," paper presented at the PAA meeting, New Orleans, April. Processed, Yale University (revised June).

_____ (1988b) "The Relationship between Local Family Planning Expenditures and Fertility in Thailand, 1976-1981." Processed, Yale University.

_____ (1988c) "Wage Opportunities and Family Labor Supply Behavior in Thailand in 1981." Yale University, work in progress.

_____ (1988d) "Economic Demography and Development: New Directions in an Old Field," (eds.) G. Ranis and T. P. Schultz in The State of Development Economics, London: Basil Blackwell.

_____ (1988e) "Educational Investment and Returns. In Handbook of Development Economics: 1 (eds.) H. Chenery and T.N. Srinivasan, Amsterdam: North Holland.

_____ and D. Thomas (1989) "Expenditure Patterns and Bargaining Models of Family Behavior," mimeo, Yale University, work in progress.

Schultz, T.W. (1967) "The Rate of Return in Allocating Investments to Education", Journal of Human Resources, 2:3 (Summer) 93-309.

_____, (1974) "Fertility and Economic Values," in Economics of the Family, (ed.) T.W. Schultz, Chicago: University of Chicago Press.

_____ (1975) "The Value of the Ability to Deal with Disequilibrium," Journal of Economic Literature 13(3):827-846.

_____ (1981), Investing in People: The Economics of Population Quality, Berekeley, CA: University of California Press.

Schwartz, A. (1976) "Migration, Age and Education," Journal of Political Economy, 84:4, pt. 1, (August) 701-720.

Sen, A.K. (1987) "Gender and Cooperative Conflict," Harvard Institute of Economic Research Discussion Paper 1342 (October).

_____ (1989) "Family and Food: Sex Bias in Poverty" in Rural Poverty in South India (eds.) T.N. Srinivasan and P.K. Bardhan, New York, Columbia University Press, work in progress.

Sen, G. (1983) "Women's Work and Women Agricultural Labourers: A Study of the Indian Census," Working Paper No. 159, Centre for Development Studies, Ulloor, Trivandrum, India (February).

Senauer, B., M. Garcia and E. Jacinto (1988) "Determinants of the Intrahousehold Allocation of Food in the Rural Philippines," American Journal of Agricultural Economics 70:1 (February) 170-180.

_____ D. Sahn and H. Alderman, (1986) "The Effects of the Value of Time on Food Consumption Patterns in Developing Countries: Evidence from Sri Lanka," American Journal of Agricultural Economics 68:4, pp. 920-927.

Sengupta, P. (1986) "Demographic Influences on Female Labor Supply," unpublished Demography Ph.D. dissertation, University of California, Berkeley,

Shields, N. (1980) "Women in the Urban Labour Markets of Africa: The Case of Tanzania," World Bank Staff Working Paper No. 380, Washington, D.C.

Sindelar, J.L. (1982) "Differential Use of Medical Care by Sex" Journal of Political Economy 90:5 (October) 1003-1019.

Singh, I., L. Squire and J. Strauss, (eds.) (1986) Agricultural Household Models: Extensions, Applications and Policy, Baltimore: Johns Hopkins Press.

Singh, R.D., E.W. Kehrberg and W.H.M. Morris (1984) "Small Farm Production Systems in Upper Volta," Station Bulletin No. 442, Dept. of Agricultural Economics, Agricultural Experiment Station, Purdue University.

_____ (1967) Education as Investment, Meerut, India, Meen-akshi Prakashan.

Sirilaksana Chutikul (1986) Malnourished Children, East-West Population Institute, East-West Center, Honolulu: University of Hawaii, No. 102.

Smith, D.P. (1981) Marriage Dissolution and Remarriage in Sri Lanka and Thailand, WFS Scientific Reports No. 7, Voorburg, Netherlands: International Statistical Institute.

Smith, J.P. (ed.) (1980) Female Labor Supply, Princeton, NJ: Princeton University Press.

_____ and M.P. Ward (1985) "Time Series Growth in the Female Labor Force," Journal of Labor Economics 3:1 (January) 559-590.

Snell, K.D.M. (1985) Annals of the Labouring Poor. Cambridge: Cambridge University Press.

Spring, A., C. Smith and F. Kayuni (1983) "Women Farmers in Malawi: Their Contribution to Agriculture and Participation in Development Projects," USAID, Office of Women in Development (April 28).

Standt, K. (1978) "Agricultural Productivity Gaps: A Case Study of Male Preference in Government Policy Implementation," Development and Change, Vol. 9, London and Beverly Hills, CA: SAGE.

Strauss, J. (1986). "Does Better Nutrition Raise Farm Productivity?," Journal of Political Economy 94(2): 297-320.

_____ (1987) "Households, Communities and Preschool Children's Nutritional Outcomes: Evidence from Rural Cote D'Ivoire," Economic Development and Cultural Change, forthcoming.

Srinivasan, T.N. (1981) "Malnutrition: Some Measurement and Policy Issues", Journal of Development Economics, 11:3 327-354.

Sulaiman, I.L. (1987). "Mother's Income and Child Mortality in Southern Nigeria," African Demography Working Paper No. 15, Population Studies Center, University of Pennsylvania (February).

Sussangkarn, C., (1988), "Production Structures, Labour Markets and Human Capital Investments: Issues of Balance for Thailand", Thailand Development Research Institute, Bangkok (January).

Svenberg, P. (1988) "Undernutrition in subSaharan Africa: Is There a Sex-Bias?" Seminar paper No. 421, Institute for International Economic Studies, Stockholm (October).

Thias, H.H. and M. Carnoy (1969) "Cost Benefit Analysis of Education: A Case Study of Kenya," Economics Dept. Report EC-173, The World Bank, Washington, DC.

Tilak, J.B.G., (1981), "Returns to Education in India: A Review", Bulletin of the Institute of Education, 2: 49-74.

Tilak, J.B.G., (1987), The Economics of Inequality in Education, Sage Pub. India, New Dehli.

Tinbergen, J. (1951) "Some Remarks on the Distribution of Labour Incomes", International Economic Papers, 1: 195-207.

Thomas, D. (1989) "Intra Household Resource Allocation: An Informational Approach", processed, Economic Growth Center, Yale University (January).

_____, J. Strauss, and M.H. Henriques (1987) "Child Survival, Nutritional Status and Household Characteristics," Economic Growth Center Discussion Paper No. 542, Yale University, New Haven, CT.

Timmer, C.P. (1973) "Choice of Technique in Rice Milling," Bulletin of Indonesian Economic Studies 9:2 (1973).

Treas, J. (1988) "Money in the Bank: Transaction Costs and Privatized Marriage," American Sociological Review (forthcoming).

United Nations (1982a) Demographic Indicators of Countries: Estimates and Projections as Assessed in 1980, Department of International Economic and Social Affairs (ST/ESA/SER.A/82) New York.

_____ (1982b) Levels and Trends of Mortality Since 1950, Department of International Economic and Social Affairs (ST/ESA/SER.A/74) New York.

U. S. Department of Health and Human Services (1983) Final Report of the Seattle-Denver Income Maintenance Experiment, Washington, D. C.: U. S. Government Printing Office:, Vol. I, Part V.

Van der Gaag, J. and W. Vijverberg (1987) Wage Determinants in Cote d'Ivoire, LSMS Discussion Paper No. 33, The World Bank, Washington D.C. (April).

Visaria, P.M. (1971) The Sex Ratio of the Population of India, 1961, Census of India Vol. 1, Monograph 10, New Delhi: Office of Registrar General of India.

Waldron, I. (1983) "Sex Differences in Illness Incidence, Prognosis and Mortality: Issues and Evidence", Soc. Sci. Med., 17(16): 1107-1123.

_____ (1983) "Sex Differences in Human Mortality", Soc. Sci. Med. 17(6): 321-333.

_____ (1987) "Patterns and Causes of Excess Female Mortality among Children in Contemporary Developing Countries," World Health Statistics Quarterly.

Wallace, T.D., (1974), "Comment," in Economics of the Family, (ed.) T.W. Schultz, Chicago: University of Chicago Press.

Walker, T.S. (1987) "Making Agricultural Extension Work with Women: The Efforts of MIDENO in Cameroon," a report of the Equity Policy Center, Chevy Chase, MD (September).

Weinberger, M.B. and L. Heligman (1987) "Do Social and Economic Variables Differentially Affect Male and Female Child Mortality," mimeo, UN Population Division paper presented at PAA meetings Chicago (April).

Weisbrod, B.A. (1964) External Benefits of Public Education, Industrial Relations Section, Princeton University.

Welch, F. (1966) "Measurement of the Quality of Schooling", American Economic Review 56:2 (May) 379-392.

_____ (1969), Linear Synthesis of Skill Distribution", Journal of Human Resources, 4:3 (Summer), 311-327.

_____ (1970) "Education in Production", Journal of Political Economy, 38: 1 (January) 35-59.

Willis, R.J. (1974) "Economic Theory of Fertility Behavior," in Economics of the Family (ed.) T.W. Schultz, Chicago: University of Chicago Press.

_____ and S. Rosen (1979) "Education and Self-Selection," Journal of Political Economy 87:5, Pt. 2 (October).

Winikoff, B. (1988) "Women's Health: An Alternative Perspective for Choosing Interventions," Studies in Family Planning 19:4 (July/August) 197-214.

Wolfe, B. and J. Behrman (1982) "Determinants of Child Mortality, Health and Nutrition in a Developing Country," Journal of Development Economics pp. 163-193.

Woodhall, M. (1973) "Investment in Women: A Reappraisal of the Concept of Human Capital," International Review of Education (Spring) pp. 9-28.

World Bank, (1988), World Development Report 1988, Oxford University Press, New York.

Young, M.E. and A. Prost (1985) Child Health in China, World Bank Staff Working Paper No. 767, Washington D.C.

Youssef, N., and C. Hefler (1983) "Establishing the Conditions of Women-Headed Households in the Third World," in Women and Poverty in the Third World, (eds.), M. Buvinic, M. A. Lycette and W. P. McGreevy, Baltimore, MD: Johns Hopkins University Press.

Zachariah, K. C. and My T. Vu (1988) World Population Projections 1987-88 Edition, Baltimore, MD: Johns Hopkins University Press.

Zeng, Yi (1988) "Population Policies in China: New Challenges and Strategies," Mimeo, Peking University, Beijing, China.

Table A-1

Years of Education Completed of Women Relative to Men by Age in Most Recent Available Census

Region* Country	Year	Level of Male Schooling in Years Age 20-24	Female Relative to Male Years of Schooling 20-24	25-34	35-44	45-54	55-64
Africa (excluding S. Africa)		**2.34**	**.43**				
Malawi	1977	4.40	.49	.44	.33	.32	.25
Mauritius	1962	4.73	.66	.66	.61	.61	.68
Rwanda	1978	2.77	.61	.40	.20	.13	.10
Zambia	1969	4.92	.44	.34	.26	.25	.20
Egypt	1976	3.54	.35	.40	.27	.20	.18
Libya	1973	5.35	.23	.12	.14	.08	.06
South Africa	1970	5.97	1.02	.96	.93	.93	.93
Liberia	1974	4.14	.26	.27	.28	.29	.23
Mali	1976	1.15	.26	.26	.20	.13	.11
Sierra Leone	1963	1.04	.28	.21	.48	.04	.75
Latin America		**3.41**	**.84**				
Cuba	1981	8.79	.99	.93	.83	.88	.81
Domin. Republic	1970	4.19	.95	.86	.81	.81	.81
Haiti	1971	3.86	.68	.83	.83	.86	.99
Jamaica	1960	9.21	1.11	1.08	1.06	1.06	1.05
Puerto Rico	1970	9.97	1.04	.98	.87	.85	.84
Trinidad/Tob.	1980	7.31	1.05	1.00	.94	.88	.84
Costa Rica	1973	6.29	1.02	.99	.97	.96	.98
El Salvador	1961	2.98	.88	.81	.72	.69	.68
Guatemala	1964	1.73	.84	.89	.81	.78	.73
Honduras	1974	3.25	.99	.91	.79	.77	.79
Nicaragua	1950	1.37	1.03	.93	.86	.81	.79
Panama	1980	8.21	1.03	1.00	.98	.98	.95
Argentina	1980	8.64	1.03	1.01	.98	.96	.99
Chile	1960	5.46	.99	.97	.93	.93	.90
Uruguay	1975	7.87	1.08	1.06	1.05	1.02	.99
Bolivia	1976	6.42	.69	.61	.53	.53	.14
Brazil	1980	6.30	1.02	1.00	.96	.94	.94
Colombia*	1973	5.18	.92	.92	.92	.92	.92
Ecuador	1974	5.56	.93	.86	.83	.80	.77
Paraguay	1972	5.15	.92	.92	.87	.81	.74
Peru	1972	6.43	.76	.69	.63	.62	.60
Venezuela	1950	3.90	.80	.66	.61	.66	.78
East Asia (excluding Japan)		**6.35**	**.82**				
Hong Kong	1981	8.79	.94	.89	.79	.56	.46
South Korea	1980	10.13	.87	.83	.69	.53	.42
Taiwan	1956	5.00	.58	.48	.33	.21	.16
Indonesia	1980	3.98	.75	.75	.70	.73	.88
Malaysia	1957	4.42	.44	.33	.23	.14	.10
Philippines	1975	7.56	1.05	1.00	.96	.91	.86
Singapore	1980	4.90	1.04	.83	.65	.47	.34
Thailand	1980	6.02	.93	.89	.82	.78	.66
South and West Asia		**4.42**	**.48**				
India	1971	4.39	.40	.32	.28	.23	.17
Iran	1966	3.33	.41	.33	.27	.28	.18
Nepal	1981	2.36	.25	.22	.20	.21	-
Pakistan	1961	2.20	.21	.20	.19	.17	.13
Sri Lanka	1981	6.84	.99	.95	.85	.73	.70
Jordan	1961	4.81	.30	.28	.26	.30	.30
Syria	1970	4.62	.38	.31	.24	.19	.16
Israel	1961	8.52	.90	.84	.84	.82	.75
High Income Countries		**9.13**	**1.00**				
Japan	1980	10.33	1.01	.98	.95	.93	.94
Australia	1966	9.49	1.01	.98	.96	.96	.97
New Zealand	1981	12.17	.99	1.01	.98	1.00	.97
Canada	1981	11.13	1.01	.97	.96	.96	.97
United States	1980	12.57	1.01	.98	.96	.97	.98
Bulgaria	1975	8.44	1.03	1.03	.93	.89	.84
Czechoslovakia	1980	11.46	.98	.96	.93	.89	.89
German Dem. Rep.	1971	9.97	1.00	.93	.78	.74	.73
Hungary	1970	8.68	1.07	.99	.92	.91	.93
Poland	1970	9.03	1.04	.99	.89	.89	.87
Romania	1966	7.91	.94	.90	.88	.89	.91
Finland	1970	9.88	1.07	1.04	1.05	1.02	1.01
Ireland	1966	6.65	1.11	1.03	1.03	1.03	1.04
Norway	1980	11.47	1.01	.96	.93	.93	.95
Sweden	1970	8.73	1.05	1.01	.95	.93	.91
Greece	1961	6.60	.90	.86	.83	.78	.77
Italy	1971	8.57	.90	.84	.81	.76	.77
Portugal	1970	5.89	1.01	1.01	.99	.96	.92
Spain	1970	6.78	1.00	1.00	1.02	1.01	1.03
Yugoslavia	1971	8.03	.89	.67	.61	.60	.81
Belgium	1970	10.03	.98	.96	.96	.93	.93
France	1975	8.20	1.09	1.03	1.02	.99	.66
Netherlands	1960	7.73	1.01	.97	.96	.96	.97
Switzerland	1960	7.07	.96	.94	.92	.92	.90

*Regional averages are unweighted and as noted South Africa is excluded from Africa and Japan is included in high income category.

Source: Estimated from census and survey tabulations of populations.

Table A-2

Market Labor Supply Estimates for Women, Age 25 to 54: Thailand 1981[a]

Dependent Variable:	Participation		Hours per Week	Sample Means[b]
Estimation Method:	Probit	OLS	OLS	
Explanatory Variables				
Market Opportunity Wages: (Ln Baht/hour)				
Woman[c]	.467	.114	-1.13	.771
	(10.0)	(11.9)	(1.73)	(.673)
Husband[c]	-.408	-.111	-6.83	.934
	(10.6)	(13.7)	(12.4)	(.987)
Husband Present (=1)	.215	.0583	3.47	.699
	(2.75)	(3.83)	(3.36)	
Unearned Income: (Baht/month x 10^{-4})				
Woman	-3.11	-.580	-30.8	.0156
	(10.8)	(13.0)	(10.2)	(.0856)
Husband	-.426	-.108	-4.20	.00987
	(1.82)	(1.81)	(1.03)	(.0633)
Age of Woman	.131	.0267	2.78	36.1
	(5.87)	(5.53)	(8.49)	(8.13)
Age squared (x 10^{-2})	-.174	.0353	-3.49	13.73
	(5.99)	(5.59)	(8.15)	(6.18)
Residential Area:				
Bangkok	-.550	-.137	-8.08	.267
	(12.2)	(13.4)	(11.7)	
Municipal	-.751	-.174	-3.82	.364
	(10.9)	(11.6)	(3.75)	
Sanitary Dist.	-.425	-.0755	-2.29	.154
	(7.06)	(5.92)	(2.65)	
Northeast Region	-.261	-.0607	-2.94	.274
	(5.36)	(6.20)	(4.43)	
Intercept	-7.67	.467	3.35	
	(1.89)	(5.30)	(.56)	
R^2		.147	.145	
χ^2	1146.3			
Sample Size	8380	8380	8380	8380
Dependent Variable Mean (S.D.)	.834 (.372)	.834 (.372)	46.0 (25.2)	

Notes:

[a] t ratios are reported beneath ordinary least squares (OLS) regression coefficients in parentheses, and asymptotic t ratios are reported beneath probit coefficients in parentheses.

[b] Means of variables with the 1981 SES sample used for estimation, and standard deviations reported in parentheses.

[c] Endogenous wage variables imputated from wage equations corrected for two sample selection biases of persons participating in labor force and reporting a wage rate. See Tables A-7 and A-6.

Table A-3

Market Labor Supply Estimates for Men, Age 25 to 54: Thailand 1981[a]

Dependent Variable: Estimation Method:	Participation Probit	Participation OLS	Hours per Week OLS	Sample Means[b]
Explanatory Variables				
Market Opportunity Wages: (Ln Baht/hour)				
Man[c]	.124	.0056	-9.75	1.39
	(1.17)	(.81)	(12.9)	(.938)
Wife[c]	-.160	.0042	-2.94	.558
	(1.87)	(.81)	(5.19)	(.623)
Wife Present (=1)	1.03	.0672	7.70	.805
	(8.90)	(9.90)	(10.3)	
Unearned Income: (Baht/month x 10^{-4})				
Man	-1.27	-.185	-9.57	.0127
	(4.84)	7.17	(3.40)	(.0727)
Wife	-.995	-.0147	.495	.00342
	(1.86)	(2.75)	(.08)	(.0349)
Age of Man	.139	.00879	1.73	38.3
	(3.49)	(3.64)	(6.53)	(8.41)
Age squared (x 10^{-2})	-.191	-.0116	-1.87	15.3
	(3.77)	(3.83)	(5.63)	(6.57)
Residential Area:				
Bangkok	.101	-.0076	-.938	.268
	(1.11)	(1.37)	(1.55)	
Municipal	-.506	-.0331	11.3	.356
	(2.89)	(3.06)	(9.56)	
Sanitary Dist.	-.205	-.0102	4.90	.153
	(1.50)	(1.39)	(6.08)	
Northeast Region	.0638	.0019	-2.69	.273
	(.58)	(.33)	(4.21)	
Intercept	-.883	.769	23.9	
	(1.21)	(17.1)	(4.85)	
R^2		.0517	.1401	
χ^2	287.5			
Sample Size	7278	7278	7278	7278
Dependent Variable Mean (S.D.)	.973 (.162)	.973 (.162)	56.0 (18.7)	

Notes:

[a] t ratios are reported beneath ordinary least squares (OLS) regression coefficients in parentheses, and asymptotic t ratios are reported beneath probit coefficients in parentheses.

[b] Means of variables with the 1981 SES sample used for estimation, and standard deviations reported in parentheses.

[c] Endogenous wage variables imputated from wage equations corrected for two sample selection biases of persons participating in labor force and reporting a wage rate. See Tables A-7 and A-8.

Table A-4

Likelihood That Spouse is Present in Household,
Women and Men, Age 25 to 54:
Thailand 1951[a]

Estimation Method:	Women Probit	Men Probit
Explanatory Variables:		
Wage (ln Baht/hour)[b]	-.310 (8.65)	-.271 (4.39)
Unearned Income (individual's) (Baht/month x 10^{-4})	-4.08 (15.1)	.8.61 (2.49)
Age	.310 (16.7)	.566 (25.3)
Age Squared (x 10^{-2})	-.406 (16.7)	-.653 (22.8)
Residential Area:		
Bangkok	-.0306 (.78)	-.0048 (.09)
Municipal	.0375 (.74)	.0176 (.17)
Sanitary Dist.	.0329 (.68)	.0727 (.98)
Northeast Region	.0214 (.58)	.0142 (.24)
Intercept	-4.79 (14.1)	-10.3 (24.7)
χ^2	887.4	1554.9
Sample Size	8380	7278
Dependent Variable Mean (S.D.)	.699	.805

[a] Asymptotic t ratios are reported beneath probit coefficients in parentheses.

[b] Endogenous wage variables imputed from wage equations corrected for two sample selection biases of persons in the labor force and in a wage job. See Tables A-7 and A-8.

Table A-5

Sectoral Shares of Female Workers and Share in Wage Employment by Sector and Region[a]

Sector of Employment:	Share of Female Workers Employed in Sector							Share of Female Workers Who Are Wage Earners						
	World	High[b] Income	Low[b] Income	Latin America	North Africa	East Asia	South & West Asia	World	High[b] Income	Low[b] Income	Latin America	North Africa	East Asia	South & West Asia
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Agriculture	.404	.121	.663	.205	.673	.609	.821	.275	.138	.297	.297	.075	.195	.344
	(.345)	(.149)	(.258)	(.158)	(.313)	(.166)	(.113)	(.211)	(.174)	(.207)	(.237)	(.167)	(.149)	(.207)
Mining	.003	.003	.002	.004	.001	.001	.003	.875	.966	.758	.831	.925	.535	.773
	(.003)	(.004)	(.002)	(.003)	(.003)	(.000)	(.001)	(.139)	(.023)	(.137)	(.164)	(.145)	(.222)	(.047)
Manufacturing	.158	.219	.103	.177	.076	.109	.080	.771	.925	.471	.723	.486	.537	.268
	(.088)	(.056)	(.075)	(.065)	(.112)	(.076)	(.059)	(.276)	(.077)	(.276)	(.200)	(.285)	(.240)	(.170)
Utilities	.003	.004	.001	.003	.002	.000	.002	.914	.995	.696	.946	.971	.918	.587
	(.002)	(.002)	(.002)	(.003)	(.003)	(.001)	(.001)	(.171)	(.005)	(.207)	(.062)	(.133)	(.159)	(.134)
Construction	.008	.013	.004	.005	.003	.003	.004	.808	.838	.716	.900	.883	.877	.595
	(.007)	(.008)	(.003)	(.003)	(.005)	(.003)	(.003)	(.133)	(.095)	(.179)	(.092)	(.182)	(.078)	(.117)
Commerce	.143	.218	.074	.128	.032	.158	.016	.627	.775	.231	.501	.342	.129	.155
	(.095)	(.043)	(.077)	(.062)	(.021)	(.054)	(.013)	(.307)	(.175)	(.223)	(.206)	(.243)	(.116)	(.183)
Transportation	.016	.029	.004	.011	.007	.003	.003	.952	.968	.850	.943	.963	.881)	(.715)
	(.014)	(.008)	(.006)	(.004)	(.010)	(.006)	(.003)	(.074)	(.026)	(.153)	(.074)	(.037)	(.136)	(.136)
Services	.265	.393	.148	.469	.200	.116	.072	.883	.927	.773	.824	.965	.811	.624
	(.190)	(.123)	(.162)	(.142)	(.222)	(.069)	(.059)	(.127)	(.056)	(.174)	(.084)	(.040)	(.098)	(.249)
NonAgriculture	.596	.879	.337	.795	.327	.391	.179	.793	.889	.561	.752	.780	.458	.427
	(.345)	(.149)	(.258)	(.158)	(.313)	(.166)	(.113)	(.207)	(.088)	(.223)	(.109)	(.198)	(.169)	(.208)
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.583	.799	.385	.658	.306	.298	.359
								(.288)	(.186)	(.213)	(.167)	(.342)	(.142)	(.188)
Participation rate[c]	.349	.377	.326	.247	.124	.452	.328							
	(.135)	(.089)	(.158)	(.083)	(.143)	(.146)	(.145)							
Number of Countries	61	22	39	17	6	6	10	61	22	39	17	6	6	10
Employment Weight (in percent)	100	48	52	08	01	15	28	100	48	52	08	01	15	28

[a] Country means are weighted by female employment in sector or economy, and weighted standard deviation is reported in parentheses beneath mean.
[b] High income countries are synonymous with the "West" category in Table A-1 and includes Japan, Western Europe, Canada, USA, Australia and New Zealand, and low income countries include the remainder. See Table A-1 for a list including the regional breakdown of the "low income" countries.
[c] Female labor force participants for female age 15 or more.

Source: Schultz (1988: Table 2). Based on population weighted sample of 61 countries providing two or more censuses with the required tabulations of the labor force and GNP series.

Table A-6

Sectoral Shares of Male Workers and Share in Wage Employment by Sector and Region[a]

Sector of Employment:	Share of Male Workers Employed in Sector							Share of Male Workers Who Are Wage Earners						
	World	High[b] Income	Low[b] Income	Latin America	North Africa	East Asia	South & West Asia	World	High[b] Income	Low[b] Income	Latin America	North Africa	East Asia	South & West Asia
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Agriculture	.445	.138	.623	.477	.547	.627	.668	.255	.289	.250	.367	.377	.161	.242
	(.265)	(.112)	(.133)	(.127)	(.107)	(.147)	(.095)	(.117)	(.144)	(.111)	(.124)	(.172)	(.080)	(.081)
Mining	.011	.019	.006	.016	.008	.004	.006	.941	.972	.882	.941	.969	.835	.857
	(.011)	(.013)	(.006)	(.013)	(.010)	(.003)	(.002)	(.075)	(.036)	(.092)	(.063)	(.050)	(.170)	(.058)
Manufacturing	.174	.286	.109	.164	.105	.082	.101	.808	.928	.623	.825	.785	.702	.501
	(.098)	(.058)	(.042)	(.036)	(.029)	(.059)	(.019)	(.193)	(.059)	(.180)	(.082)	(.116)	(.135)	(.109)
Utilities	.008	.016	.004	.007	.006	.002	.004	.974	.991	.935	.943	.984	.962	.922
	(.007)	(.005)	(.003)	(.007)	(.004)	(.003)	(.002)	(.043)	(.012)	(.058)	(.049)	(.033)	(.055)	(.058)
Construction	.061	.110	.033	.068	.053	.031	.023	.805	.837	.742	.774	.839	.826	.666
	(.047)	(.023)	(.032)	(.028)	(.047)	(.021)	(.026)	(.116)	(.062)	(.160)	(.093)	(.097)	(.123)	(.189)
Commerce	.103	.155	.073	.091	.082	.092	.061	.543	.735	.305	.483	.343	.234	.256
	(.051)	(.041)	(.027)	(.026)	(.014)	(.035)	(.017)	(.254)	(.139)	(.135)	(.089)	(.071)	(.134)	(.077)
Transportation	.051	.078	.035	.050	.044	.038	.029	.831	.925	.708	.718	.818	.704	.692
	(.026)	(.012)	(.016)	(.015)	(.015)	(.020)	(.011)	(.131)	(.048)	(.100)	(.091)	(.052)	(.119)	(.091)
Services	.149	.201	.118	.137	.155	.123	.109	.816	.872	.759	.758	.902	.855	.714
	(.063)	(.061)	(.040)	(.058)	(.026)	(.031)	(.032)	(.107)	(.031)	(.123)	(.115)	(.046)	(.053)	(.119)
NonAgriculture	.555	.862	.377	.523	.453	.373	.332	.767	.870	.630	.734	.760	.651	.564
	(.265)	(.112)	(.133)	(.127)	(.107)	(.147)	(.095)	(.146)	(.054)	(.114)	(.044)	(.056)	(.083)	(.099)
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.529	.790	.393	.559	.551	.344	.349
								(.228)	(.113)	(.130)	(.101)	(.150)	(.118)	(.084)
Participation rate[c]	.823	.754	.877	.834	.786	.831	.919							
	(.105)	(.080)	(.090)	(.091)	(.148)	(.067)	(.062)							
Number of Countries	61	22	39	17	6	6	10	61	22	39	17	6	6	10
Employment Weight (in percent)	100	37	36	11	3	11	39	100	37	36	11	3	11	39

[a] Country means are weighted by male employment in sector or economy, and weighted standard deviation is reported in parentheses beneath mean.
[b] High income countries are synonymous with the "West" category in Table A-1 and includes Japan, Western Europe, Canada, USA, Australia and New Zealand, and low income countries include the remainder. See Table A-1 for a list including the regional breakdown of the "low income" countries.
[c] Male labor force participants to males age 15 or more.

Source: (Schultz (1988: Table 1). See Table A-5 note for limitations of sample.

Table A- 7
Sample Selection Corrected Wage Functions,
Women, Age 25-54: Thailand, 1981[a]

Dependent Variable	Participation	Wage Earner	Log of Wage Rate	Log of Monthly Earnings	Sample Means
Estimation Method	Probit	Probit	OLS	OLS	(S.D.)
Explanatory Variables:					
Schooling in Years:					
Primary	.00068	-.0248	.100	.0903	4.13
	(.06)	(2.34)	(5.00)	(4.56)	(1.75)
Secondary	.0982	.240	.247	.219	1.45
	(7.45)	(20.7)	(6.77)	(6.09)	(2.45)
Higher	.163	.145	.108	.116	.232
	(3.58)	(4.05)	(3.04)	(3.32)	(.925)
Post School Experience in years	.146[a]	-.0046[a]	.0901	.0887	23.1
	(7.36)	(.26)	(6.54)	(6.53)	(9.99)
Experience Squared ($\times 10^{-2}$)	-.191	-.0171	-.122	-.125	6.34
	(7.49)	(.73)	(4.73)	(4.88)	(5.11)
Residential Areas					
Bangkok	-.489	-.0152	.242	.289	.304
	(11.9)	(.39)	(2.97)	(3.59)	
Municipal	-.699	-.411	.742	.688	.384
	(16.3)	(10.4)	(6.22)	(5.84)	
Sanitary Dist.	-.364	-.0205	.442	.400	.170
	(7.00)	(.47)	(5.76)	(5.28)	
Northeast Region	-.166	-.271	-.107	-.0648	.199
	(3.66)	(7.07)	(1.43)	(.88)	
Unearned Income ($\times 10^{-4}$)	-1.33	-.657			.0153
	(7.34)	(3.39)			
Hectares at Land Owned:					
Irrigated Land	.0241	-.0158			1.94
	(5.46)	(6.67)			
Dry Land	.0187	-.0177			5.35
	(7.61)	(10.5)			
Participation λ			2.80	2.78	.285[b]
			(9.26)	(9.29)	
Wage Earner λ			-1.45	-1.35	1.05[b]
			(7.69)	(7.24)	
Intercept	-1.24	.0727	-.818	4.51	
	(3.33)	(.22)	(2.97)	(16.6)	
$\bar{r}^2/\chi^2$	1145.1	1278.3	.624	.597	
Sample Size	8816	8816	2419	2419	
Dependent Variable Means (Standard deviation)	.829	.380	.970 (1.81)	6.26 (1.72)	

[a] t ratios are reported beneath ordinary least squares (OLS) regression coefficients in parentheses, and asymptotic t ratios are reported beneath probit coefficients in parentheses.

[b] Means of variables with the 1981 SES sample used for estimation, and standard deviations reported in parentheses.

Table A-8
Sample Selection Corrected Wage Functions,
Men, Age 25-54: Thailand, 1981[a]

Dependent Variable	Participation	Wage Earner	Log of Wage Rate	Log of Monthly Earnings	Sample Means
Estimation Method	Probit	Probit	OLS	OLS	(S.D.)
Explanatory Variables:					
Schooling in Years:					
Primary	.0916	.0368	.143	.145	4.43
	(3.78)	(3.16)	(8.95)	(9.22)	(1.49)
Secondary	-.0913	.115	.130	.0883	1.31
	(4.64)	(10.6)	(9.04)	(6.24)	(2.25)
Higher	-.0126	.0315	.0407	.0293	.159
	(.31)	(1.06)	(1.66)	(1.22)	(.774)
Post School Experience in years	.232[a]	.0318[a]	.0471	.0451	24.6
	(6.22)	(1.84)	(4.12)	(3.93)	(9.71)
Experience Squared ($\times 10^{-2}$)	-.295[a]	.0587[a]	-.0292	-.0297	6.97
	(6.17)	(2.64)	(1.35)	(1.40)	(5.08)
Residential Area					
Bangkok	-.0536	.236	.371	.370	.307
	(.66)	(6.05)	(7.840	(7.99)	
Municipal	-.333	-.231	1.28	1.27	.377
	(3.79)	(5.89)	(25.6)	(25.9)	
Sanitary Dist.	-.101	.0889	.675	.655	.
	(.93)	(2.06)	(13.5)	(13.4)	
Northeast Region	.0040	.0380	-.558	-.487	.257
	(.04)	(1.07)	(13.3)	(11.9)	
Unearned Income ($\times 10^{-4}$)	-1.18	-.303			.0124
	(4.55)	(1.43)			
Hectares of Land Owned:					
Irrigated Land	.00728	-.0201			1.91
	(1.10)	(9.54)			
Dry Land	.00490	-.0179			5.21
	(1.29)	(13.1)			
Participation λ			.454	.587	.0546[b]
			(.75)	(.996)	
Wage Earner λ			-1.87	-1.83	.633[b]
			(13.6)	(13.5)	
Intercept	-2.36	-.272	.286	5.68	
	(3.34)	(.83)	(1.36)	(27.	
R^2/χ^2	153.3	875.3	.552	.528	
Sample Size	7986	7986	4525	4525	
Dependent Variable Means (standard deviation)	.978	.568	1.46 (1.68)	6.80 (1.60)	

[a] t ratios are reported beneath ordinary least squares (OLS) regression coefficients in parentheses, and asymptotic t ratios are reported beneath probit coefficients in parentheses.

[b] Means of variables with the 1981 SES sample used for estimation, and standard deviations reported in parentheses.

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Appendix Table B

Estimates of Life Expectancy at Birth and Mortality for Women and Men from Africa and Asia

Country	Years	Life Expectation at Birth in Years		Ratio of Female to Male Life Expectation	Ratio of Age Specific Mortality Rates of Males to Females				
		Male	Female		Less Than One Year (infant)	Age 1 to 5	Age 5 to 10	Age 10 to 15	Age 15 to 35*
Africa									
Algeria	1948-51	44	49	1.11					
	1954-56	39	45	1.15					
	1969-70	50	54	1.08	1.00	.90	.52	.74	.89
	1970	53	54	1.02					
Egypt	1948-52	40	41	1.03	1.01				
	1958-62	48	49	1.02	.97				
	1963-67	49	50	1.02	.97	.99	1.06	1.04	1.16
Libya	1964-74	51	54	1.06	1.07				
	1968-73	52	55	1.06	1.07				
Morocco	1970	48	49	1.02	1.25				
Sudan	1968-73	43	44	1.02					
Tunisia	1968	52	50	.96	1.00				
	1968-69	54	55	1.02	1.02	.85	1.14	1.14	.82
Burundi	1965	39	42	1.08					
	1970-71	43	46	1.07					
Kenya	1969				.99	.90	.94	1.08	1.22
Madagascar	1966				1.40	1.18	1.19	1.21	1.06
Mauritius	1951-53	50	52	1.04					
	1961-63	59	62	1.05					
	1970-72	61	65	1.07	1.26	.88	.90	1.50	.81
Tanzania (mainland)	1967	39	42	1.08					
Central Africa									
Republic	1959-60	35	36	1.03					
Chad	1963-64	34	35	1.03					
Congo	1960-61	36	39	1.08					
Gabon	1960-61	40	42	1.05					
Botswana	1971	51	55	1.08					
Lesotho	1956	49	50	1.02					
Benin	1961	34	36	1.06					
Ghana	1968-69	46	48	1.04					
	1975	47	50	1.06					
Liberia	1962	36	39	1.08					
Mali	1960-61	31	33	1.06					
Niger	1960	36	37	1.03					
Sierra Leone	1973	31	35	1.13					
Togo	1961	37	39	1.05					
Asia									
China	1978	67	69	1.03					
Hong Kong	1951	64	71	1.11					
	1971	67	75	1.12					
Malaysia	1956	56	58	1.04					
(Peninsular)	1972	63	68	1.08	1.32	1.05			
Philippines	1948	49	53	1.08					
	1969-71	59	64	1.08					
South Korea	1961	54	61	1.13					
	1971-75	59	66	1.12	1.08	.85			
Singapore	1956-58	61	67	1.10					
	1969-71	66	72	1.09	1.21				
Indonesia	1971	45	48	1.07	1.12	1.13			
Malaysia Sabah	1970	49	45	.92					
Sarawak	1970	52	53	1.02					
Thailand	1947	49	51	1.04	1.19				
	1969-71	59	61	1.04	1.23	.95			
Taiwan	1956	60	65	1.08	1.10	.93	1.22	1.38	
	1975	67	73	1.09	1.36	1.21	1.55	1.36	2.01
Kuwait	1974-76	66	70	1.06	1.15				
Lebanon	1970	62	66	1.06					
Sri Lanka	1945-47	45	43	.96	1.09				
	1962-64	62	63	1.02					
	1970-72	64	67	1.05		.85			
Burma	1954	41	44	1.07					
(urban)	1974	56	60	1.07		.91			
Iran	1973-76	57	57	1.00	.91	.80			
Iraq	1974-75	57	59	1.04		.96			
Afghanistan	1972-73	34	36	1.06					
Bangladesh	1974	46	47	1.02	1.10	1.04			
Dem. Yemen	1973	41	43	1.05					
India	1941-50	33	32	.97	1.09				
	1951-60	42	41	.98	1.11				
	1970-72	49	46	.94	1.01	.76			
Nepal	1952-54	32	29	.91					
	1974-76	45	42	.93	1.04				
Pakistan	1962-65	47	45	.96		.66			
Yemen	1975	38	39	1.03					

Note: *Unweighted sum of age specific mortality rates from age 15 to 35, during which most childbearing occurs and thus the effect of maternal mortality may be apparent.

Sources: United Nations (1982) various tables; Taiwan 1956 figures from Keyfitz and Fluger (1968), and Taiwan 1975 figures from Demographic Yearbooks (1984).

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